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THE GAS JOURNAL

OCTOBER 1, 1930

A Glance at the Contents—

British Commercial Gas Association.

We publish the programme of the Annual Conference at Hull and Bridlington on Oct. 27, 28, and 29.

Institution of Gas Engineers.

Mr. C. F. Broadhead, of Melbourne, replies to the discussion on his paper, "The Preparation of a New Road Binder," before the Institution of Gas Engineers at the Annual Meeting in Leeds last June.

The "Gas Unit."

Letters on this subject, from Mr. R. D. Keillor and Mr. W. B. McLusky, will be found in our Correspondence Columns. Mr. McLusky states that Mr. Keillor's plea for simplicity well deserves the support given to it by Radiation Ltd., in our issue of Sept. 24.

Watson House.

An account of the training given at Watson House to those engaged, or destined to be engaged, on the Sales Staff of the Gas Light and Coke Company is published. This will be of interest, and may serve as a useful guide, to all engaged in staff training.

Gas Exhibition at Surbiton.

The Wandsworth, Wimbledon, and Epsom District Gas Company recently opened an attractive exhibition of appliances at the Surbiton Assembly Rooms, in co-operation with Messrs. Radiation Ltd., and a number of leading manufacturers. Cookery lectures were given daily, and the exhibition was regarded as a great success.

Self-Help in the Lighting Business.

In an interesting article to-day, Mr. Frederick Shewring demonstrates that there is no need for pessimism in regard to the domestic lighting load as long as due regard is paid to efficient and artistic fittings. He describes the success of a lighting campaign in his own district by means of exhibition displays and advertising, the results of which exceeded his most hopeful expectations.

Treatise on Bread Baking.

The American Gas Association have recently issued a brochure on bread baking, representing a complete report covering the two and a half years' work conducted at the American Institute of Baking, under the auspices of the Committee on Industrial Gas Research of the American Gas Association. The work contains a detailed account of the various tests, as well as charts, data, &c., and a review of the results is given on a later page to-day.

Self-Lighting Gas Fire.

A novel feature of the "Regent Matchless" gas fire is its one-movement automatic lighting device. The mere turning on of the main tap actuates the flint and steel mechanism, producing a very strong spark which ignites the gas. The setting of the spark ensures that the gas is ignited at the proper moment, thereby preventing backfire. The air port of this fire is covered with a spring-clip gauze, which prevents foreign matter being drawn into the burner.

Sales Superintendent Required.

The Stretford and District Gas Board are inviting applications for the position of Sales Superintendent. The salary offered is £400 per annum.

General Notification of the Gas Referees.

A revised issue of the General Notification of the Gas Referees has been published by H.M. Stationery Office, the instructions given in which are to come into force as from Oct. 1. The present re-issue supersedes one which has been in force since May 1, 1929. The greater part of the matter remains unchanged, but there is some rearrangement, and the most significant of the changes introduced are included in a review of the document on a later page to-day.

Gas for Casting Kitchenware.

An article by Mr. J. B. Nealey, reprinted from the September issue of the "American Gas Association Monthly," deals with the use of gas in the permanent mould method of casting kitchenware, the practice being to melt the alloys in regular melting furnaces, transfer the molten metal to holding furnaces or crucibles, and pour direct from these into the moulds with hand ladles. For this purpose gas is the fuel employed, and time has proved it to be the cheapest method.

Annual and Local Taxation Returns.

Some interesting comparative figures are given to-day relating to the trading income and expenditure of public supply undertakings owned by the 115 local authorities included in Part II. of the Annual Local Taxation Returns for England and Wales. From this table it will be seen that, in the case of the trading departments included in the summary, the excess of gas and elctricity rentals (receipts) and other income over working expenses and loan charges amounted to £1,373,932 and £2,083,556 respectively.

Continental Notes.

Our "Continental Notes" to-day contain two brief articles of interest from a recent number of "Le Gaz et l'Electricité." The one describes the Modave process for the cleaning of producer gas, which process is also adapted to the removal of dust direct from gases in general. The second article deals with some of the methods adopted for preventing stoppages in ascension pipes, the chief cause of which is stated to be in the construction of the front brickwork, which is often too narrow. The surest safeguard, therefore, is always thick front brickwork, at the same time avoiding heating the retorts to a white heat.

Smart Gasholder Repair Work.

Mr. R. G. Shadbolt, Past-President of the Institution of Gas Engineers, describes a rapid gasholder repair at the Boston (Lincs.) Gas-Works, carried out by Messrs. Broadhead Constructions, Ltd. An order for re-sheeting the crown of a 365,000 c.ft. holder was placed on Aug. 11; the crown was completely re-sheeted on Sept. 2. Actually, the holder was out of commission for only 1 week 16 hours. Mr. Shadbolt puts forward the record as both a warning of the potentialities in many such gasholder crowns, and as an example of what is possible in the way of temporary expedients when a works is deprived of a considerable portion of its storage.

EDITORIAL NOTES

For Others

NEITHER our leisure nor our working hours can be spent to the best advantage if forgetfulness of others be the result. Happiness is intensified and labour is lightened by consideration for the less fortunate ones, and thus we rob ourselves by neglecting any opportunity of giving such consideration that comes our way. Times are bad, and in one way or another the "shoe pinches" most of us now—but to some the "pinch" is far harder than to others. What can be done to help those who feel it most?

There are many things, but for those in the gas industry one particular method presents itself—by subscribing to the Benevolent Fund of the Institution of Gas Engineers. The Committee of Management of the Fund are desirous that it should be put in such a condition as will enable them more adequately to assist those who, through no fault of their own, have fallen upon hard times. At the end of 1929, the membership of the Institution was 1405, but of this number only 518 subscribed to the Fund. Thus the total amount received during that period by way of subscription was no more than £342, while in the same period there was expended in grants a sum of £540. Further help is therefore needed, and we feel sure that, when their attention is drawn to the matter, this help will be abundantly forthcoming from the two-thirds of the members of the Institution who do not already subscribe.

Mr. C. Valon Bennett (the Engineer, General Manager, and Secretary of the Rochester, Chatham, and Gillingham Gas Company), who is a member of the Committee of Management, has personally undertaken the task of endeavouring to obtain further subscribers to the Fund, and to his appeal we would add our own, that the Fund should be made commensurate with the importance of such a body as the Chartered Institution of Gas Engineers.

An Example to Industry

FOUR years ago—it was in November, 1926—Watson House, the Research and Training Centre of the Gas Sales Department of the Gas Light and Coke Company, was inaugurated, and an account of the ceremony and an outline of the aims and achievements of the Company in regard to the education of its employees engaged, or destined to be engaged, on the distribution and utilization staff appeared in the "JOURNAL." The four years which have passed have witnessed great developments in this centralized educational system, and an account of the scope of the scheme at present—a scheme which, we suggest, is a model to the industry of this country—will prove of value to all engaged in staff training. Those who pass through the courses of training at Watson House will definitely enhance the prestige of our industry, because they are enthusiastic in their work, are imbued with the spirit of service, and are efficient either as craftsmen or in a more responsible controlling capacity.

Those who embark on any of the schemes of training at Watson House, either as apprentices or staff pupils, are led to realize that they enter, not a blind alley, but an avenue of advancement, travel on which depends upon individual effort. Apprentices are fully indentured, and staff pupils are articled; and both receive payment in wages or salary on a scale of annual increases determined by their progress. The facilities offered in the workshops and laboratories at Watson House, coupled with district and and industrial experience and with continuous technical instruction, are unique; and the thoroughness of the whole organization will be appreciated from our article on later pages of this issue. There is one feature, perhaps, which our account does not introduce, and that is the personal care expended on the general, as distinct from the specialized, education of the apprentices, and on their physical welfare. Daily physical training and special facilities for healthy recreation characterize the courses which transform the raw material into skilled and happy craftsmen. And results have already demonstrated that this enthusiasm, kept aglow by the wholesome restraint of organized and lengthy instruction, engenders the spirit of service as nothing else can. Then we come to efficiency. Every class of fitting work, as is indicated by the syllabuses of some of the courses which we reproduce, is adequately covered, and there is the incalculable advantage of the immediate touch which is maintained with current research work on gas utilization carried out in the same building.

When we regard the organization more broadly, we cannot help but appreciate that Watson House flies the banner of industrial education for all—within and without the gas industry—to behold. Between Watson House and the Education Authorities there is really effective co-operation; and as an indication of the general interest which is being taken in the scheme, it may be mentioned that the Worshipful Company of Turners have awarded during the past two years a medal for the best apprentice.

We should mention that those who emerge from the courses of training are not tied to the Company's service. At the termination of their agreements, both ex-apprentices and ex-pupils are free to roam whither they will.

Consider the Artistic

ON later pages is an article by Mr. Frederick Shewring, who, discussing the lighting load of our industry, asks all undertakings to cast off the cloak of apathy, determine a policy, and pursue it with vigour. He has infinitely more respect for a concern which says quite frankly that it has no interest in the lighting business than one which does not know its own mind, and contents itself with a few feeble gestures—probably spasmodic—which, however well meant, are in the outcome meaningless. As our readers are aware, on this matter of apathy we share Mr. Shewring's views; but we do not believe that any gas undertaking can be justified in allowing the lighting load to disappear without a sustained struggle. The fundamental point has to be remembered that the number of gas consumers far outweighs that of electricity users. This vast surplus are using gas in their homes for lighting, and it is the duty of the gas industry to see that this lighting service is a satisfactory one which spells modernity.

From the general, let us turn to the particular. Not long ago an account was given in the "JOURNAL" of the gas lighting load at Burnley. In that town there are more than 31,000 gas consumers, compared with fewer than 9000 supplied by the electricity undertaking. In other words, more than 22,000 consumers are lighting their homes by gas. What would happen if Burnley decided to let the lighting business go? In different measure the same thing applies to other concerns throughout the country; obviously apathy, where it exists, has no reasonable foundation. And there is no need for blank pessimism when electric lighting gets a hold. Again turning to Burnley as a concrete example, we learn that one large store was so impressed with the excellent gas lighting in other parts of the town that it discarded all electric lighting and substituted high-pressure gas lamps in one block of buildings. Such was the advertisement value of these lamps that within a fortnight an adjoining block belonging to a multiple store decided to employ gas. This is not ancient history; it is a story of to-day, and it demonstrates the validity of Mr. Shewring's remark that "the introduction of (say) some outdoor shop lamps, or a brilliantly lighted window or door entrance of one premises, is often the sheep which leads the flock."

The gist of Mr. Shewring's article is that the lighting load is well worth having, but that the only way of gain-

ing and retaining it is by supplying efficient and artistic burners and fittings and by giving good service after the gas lighting equipment has been installed. His own experience has proved clearly enough that enthusiasm brings a rich reward; it has proved, too, that the gas lighting fittings of yesterday will not satisfy the demands of consumers to-day. Efficiency is not sufficient, it must be allied to artistic merit; and it is in regard to the latter quality that the author sadly concludes that our industry is at fault. There is no question that gas lighting will have to be improved from the artistic point of view; far too many fittings at present in use can only be described as ugly, unnecessarily ugly. Mr. Shewring hits the nail on the head when he maintains that, immediately the decorative side of gas lighting is requested by a consumer, attempt should be made to introduce gas lighting in a sphere in which it can do itself some credit; and our readers will be interested in the suggestions which he puts forward to mitigate some of the faults in present equipment.

National Council of Industry

THE National Council of Industry and Commerce, whose advent was foreshadowed in last week's issue of the "JOURNAL," appears likely to play an important part in the country's affairs in the near future. The meeting called to consider the establishment of the Council was attended by numbers of influential business men; and a lengthy series of resolutions was agreed to. The next stage is to translate these resolutions into action, and it is by what happens then that the Council must be judged. The time is long overdue for the pursuance of some definite path which holds out promise of leading the country once more into the sunshine of prosperity.

The new movement is a non-party one, and it would be satisfactory if it proved practicable for it to remain so. One notes, however, that the main portion of the programme has relation to a matter which has long been treated on party lines; and a speaker at the meeting pointed out that the achievement of the Council's economic aims must necessarily be by political means. It is, therefore, intended to give vigorous support to parliamentary candidates who adhere whole-heartedly to the Council's policy, which is the protection of home industries, and the bringing of the component parts of the British Empire into the closest possible economic relationship. It is, indeed, proposed to take steps to ensure, if possible, that a candidate completely in favour of the Council's policy should contest every seat—special candidates being provided where there is not otherwise one whom the Council could support. The Council are none too early in the field, for already there is being prophesied a substantial increase next year in the rates of income-tax and super-tax. At the same moment a financial authority urges greater efforts to save. The gospel of saving is, he says, at present "out of fashion." Some people may feel inclined to put it differently.

Protection of Shareholders

REFERENCES have been made in the Editorial Columns of the "JOURNAL" recently to the new Stock Exchange regulations devised for the protection of the investor, and we have also taken occasion to point out the need for such protection. In his recent Presidential Address to the Society of Incorporated Accountants, Mr. Henry Morgan, F.S.A.A., devoted some attention to the same important subject, and proposed what he declared would be an effective remedy against Company abuses. His suggestion was that legislation should be passed providing that a copy of every resolution to be proposed at a company meeting should be sent to each shareholder, with necessary explanations, together with a voting paper on which he could vote either for or against such resolution. As supporting this view, he pointed out that under present conditions attendances at meetings and general proxies are almost useless. All shareholders cannot possibly attend general meetings, and it would be impossible to accommodate them if they did. In addition to this amendment of the Companies Act, he would like to see a continuation of the tightening-up of the rules and procedure of the Stock Exchange, with the limiting of underwriting of public issues to those in a position to meet any loss which might be involved.

Happily, the gas industry has small experience of such abuses as Mr. Morgan has in mind; but gas investors may not confine their attention solely to that market, and the less experienced among them may be tempted by the "glitter" which is not always "gold." Therefore it is not out of place here to draw attention to an analysis which Mr. Morgan has made of the prospectuses of the 58 companies formed for the purpose of establishing new businesses or developing new inventions, which were advertised in "The Times" during the latter half of 1928. Their issued capital amounted to £15,117,000, and the estimated profits of 52 of the Companies totalled £5,219,000. The prospectuses of the remaining six predicted substantial profits, but refrained from stating any amounts. According to the latest information he was able to obtain concerning these 52 companies, 16 had not yet published their first accounts and 14 of those were in liquidation. Of the remaining 36 companies, only 5 earned profits, which totalled less than £48,000, as compared with the prospectus estimates of over £214,000. The remaining 31 companies whose accounts were available suffered losses aggregating £690,000, as compared with prospectus profits estimated at £3,178,000. Of the whole 58 companies only one had paid a dividend, and 27 were already in liquidation. Further, it would appear that at least 16 of the remaining companies were in serious difficulties, owing to losses from divers causes, and, in nine cases, from the defaults of underwriters.

Mr. Morgan found it difficult to arrive at any definite estimate of the present value of the shares of these 58 companies. There was, he said, little likelihood of more than nominal amounts being returned to the shareholders of those companies in liquidation; while the shares of such remaining companies as were no longer quoted were less than £750,000 at the present market valuation, which in many cases was purely nominal. On this basis, it would, Mr. Morgan added, appear that some 95 p.ct. of the capital of these 58 companies has been lost, although this does not represent the total loss, since the shares in many of the companies were purchased by the public at substantial premiums.

While the lesson to be learned from Mr. Morgan's analysis may not be useful to the investor at the moment, his analysis might well be kept at hand for reference when the next new company boom comes along.

Formation of New Salesmen's Circle.

At a meeting of the Cornish Association of Gas Managers, held at Truro on Wednesday, Sept. 24, it was decided to form a Salesmen's Circle for Cornwall, and Mr. R. J. Williams, Engineer to the Truro Gas Company, was appointed Hon. Secretary. The meetings are to be held quarterly at a central town in the county, and, in addition to lectures, papers will be given by members of the Association.

The "Watch Dogs of Commerce."

Referring, at the Incorporated Accountants' Conference, to the startling and unprecedented increase that is taking place from year to year in both national and local expenditure, Mr. C. Hewetson Nelson, F.S.A.A., of Liverpool, submitted that, as no class of citizens could so readily appreciate the full significance of these paralyzing influences upon the trade and commerce of the country, or their deterrent influence upon the savings of the nation, members of the accountancy profession should, at all times and in all places, sound a warning note of the danger which threatens the nation. Accountants, he said, had been called the "watch dogs of commerce," but surely the time had come when they must greatly extend their interpretation of this phrase, in order that influences which affect commerce—such, for instance, as the fact that 65 p.ct. of the tax revenue comes largely from industrial profits—might not be overlooked. In his view, one of the supreme difficulties of the hour is that new standards of living created in the boom period are still tenaciously clung to by the people.

PERSONAL

Mr. Matthew M. Paterson (of Glasgow), who was, about eighteen months ago, appointed Distribution Engineer to the Singapore Gas Commissioners, has been promoted to Assistant Engineer. His younger brother, Mr. W. Wallace Paterson (of the Luton Gas Company) has been successful in securing the appointment—recently advertised in the "Journal"—of Assistant Distribution Engineer to the Singapore Commissioners, which is an interesting coincidence.

On his retirement from the service of the Bideford Gas and Coke Company, in whose employment he has been for over half a century, Mr. N. J. Mountjoy has been presented by the Directors and his fellow workmen with an inscribed gold watch, the presentation being made by Mr. J. H. Lowther.

OBITUARY

JOHN MARSHALL MILES.

The death occurred on Sept. 23, at his residence at Hook Heath, Woking, after a long period of ill-health, of Mr. John Marshall Miles, who for many years was a member of the Directorate of the Brighton and Hove, Hornsey, Lea Bridge, Southgate and District, and Woking and District Gas Companies.

Mr. Miles for some years was Chairman of Mudie's Library, in this position succeeding his father, who was Chairman for a very long period.

In each of the Companies above mentioned (with the exception of the Woking Company), Mr. Miles succeeded to the Directorship vacated by his father, the late Mr. John Miles, who had been associated with them for many years, first as a Director and later as Chairman.

Early in 1928, owing to serious ill-health, Mr. John Marshall Miles was compelled to retire from his many business appointments. He was held in much esteem and respect by his colleagues. Of a quiet and retiring temperament, he took the greatest interest in the affairs of the undertakings with which he was connected, which included, among others, the Woking Victoria Cottage Hospital, to whose affairs he devoted much time and attention. He will be remembered by those who knew him well as one whose meticulous aim it was at all times to be scrupulously fair and impartial in connection with every matter, great or small, upon which he was called to give a decision.

The interment took place on Sept. 26 at Southgate, which had been Mr. Miles' home in the earlier part of his life.

E. L. B.

CORRESPONDENCE

The Gas Unit.

Sir,—As soon as the advantages of sub-dividing the 100,000 B.Th.U. therm are realized there should be no difficulty in arriving at a metric system of sub-division which would find favour with gas appliance manufacturers and members of the gas industry generally.

Messrs. Radiation, Ltd., have indicated that they are willing to co-operate in fixing a convenient thermal unit for the rating of gas appliances, and it is now left to the members of the gas industry to back them up.

It is to be hoped that we do not have to wait twenty years or more for this most desirable reform, and it appears that the most practical way of introducing the idea is for the appliance manufacturers to get together and agree to a sub-division of the standard gas unit (or therm) for the purposes of propaganda, better salesmanship, and increased outputs.

A smaller unit in conjunction with the thermal rating (and cataloguing) of gas appliances is an ultimate necessity; and it is to be hoped that the leaders of the gas industry will not hesitate again to come to the assistance of the industry.

Sir Francis Goodenough's recent address to the British Association for the Advancement of Science (at Bristol on the 9th inst.) points the way we must travel, but as likely as not our leaders will miss the point of application to their own industry.

R. D. Keillor.

Knocknair, Greenock,
Sept. 27, 1930.

Mr. R. D. Keillor's plea for simplicity well deserves the support given to it by Radiation, Ltd., in your issue of Sept. 24.

The following figures may be helpful:

	Per Therm.	Per 4000 B.Th.U.
Gas (flat rate)	9d.	0·360d.
Electricity (flat rate)	—	5·275d.
	4½d. per B.o.T. Unit.	
Gas (two-part tariff)—		
Commodity*	4d.	0·160d.
Electricity (two-part tariff)—		
Commodity*	—	0·586d.
	⅓d. per B.o.T. Unit.	

* *Plus* quarterly fixed charges, which would be less in the case of gas.

W. B. McLusky,
Gas Engineer and Manager.

Halifax Corporation Gas-Works,
Mulcture Hall Road, Halifax,
Sept. 27, 1930.

FORTHCOMING ENGAGEMENTS

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Oct. 3.—North of England Gas Managers' Association.—Meeting at Darlington.

Oct. 4.—Manchester and District Junior Gas Association. Visit to Bolton and Annual General Meeting.

Oct. 4.—Scottish Junior Gas Association (Eastern District).—Opening Meeting in Edinburgh. Presidential Address of D. Yule, of Alloa.

Oct. 7.—British Commercial Gas Association.—Executive Committee Meeting.

Oct. 8.—Institution of Chemical Engineers.—Opening Meeting of the session.

Oct. 9.—Midland Junior Gas Association.—First Meeting of Session, Council House, Birmingham. Presidential Address of W. Macnaughton, of Wolverhampton.

Oct. 10.—Manchester District Institution of Gas Engineers.—Visit to the Partington Gas-Works.

Oct. 13.—Institution of Gas Engineers.—Meetings of Executive Committee, 2 p.m.; Finance Committee, 4 p.m.; Benevolent Fund Committee, 4.30 p.m., at 28, Grosvenor Gardens, S.W. 1.

Oct. 14.—Institution of Gas Engineers.—Meeting of Council, 10 a.m.; 28, Grosvenor Gardens, S.W. 1.

Oct. 15.—British Commercial Gas Association.—General Committee Meeting.

Oct. 15.—Eastern Counties Gas Managers' Association.—Autumn Meeting at the Holborn Restaurant, 2.15 p.m.

Oct. 16.—Society of British Gas Industries.—Meeting of the Council in the afternoon.

Oct. 22-23.—Institute of Fuel.—Annual Conference at the Institution of Electrical Engineers, Victoria Embankment, W.C. 2. Annual Dinner at the Connaught Rooms, Great Queen Street, W.C. 2, on Oct. 22.

Oct. 23.—Coke Oven Managers' Association.—Annual Dinner at the Hotel Great Central.

Oct. 25.—Midland Junior Gas Association.—Visit to Works of Messrs. C. & W. Walker, Ltd., Donnington, Salop.

Oct. 25.—Scottish Junior Gas Association (Eastern District).—Visit to Messrs. Henry Balfour & Co., Ltd., Leven.

Oct. 27 to 29.—British Commercial Gas Association.—Annual Meeting at Hull and Bridlington.

Nov. 19.—Society of British Gas Industries.—Autumn General Meeting in London.

Nov. 25-26.—Institution of Gas Engineers.—Autumn Meeting at the Incorporated Accountants' Hall, Victoria Embankment, W.C. 2.

THE NEWS OF THE WEEK

The Gas Meter Testing Station, together with the Weights and Measures Department, of the City of Bradford has been transferred from the Town Hall to new premises in Rawson Road.

Edward Lord, Ltd., has been registered as a private Company, with a nominal capital of £3000, to carry on the business of tar distillers, chemical manufacturers, and merchants, at Chemical Works, Baildon, Yorks.

The Largest Bye-Product Coking Plant in Europe is to be built by the Koppers Construction Company, of Pittsburg, in accordance with an agreement with the United Chemical Industries of the Soviet Union. The plant will be constructed at Magnitogorak, in the Southern Urals, and will be the third largest in the world.

The Purification of the City's Atmosphere is to be inquired into by the Liverpool Health Committee, with a view to discovering what steps are practicable towards this end. One suggestion is that a Regional Committee, on the lines of that which has reported so exhaustively on the town-planning of South-West Lancashire, should be formed in order to secure uniformity of policy over a wide area.

The Profit of the South Australian Gas Company for the year ended June 30, 1930 (before providing for special purposes fund), after paying interest on bonds and adding balance £940 carried forward from last year amounted to £76,860. This has been applied in the following manner: By the payment of a dividend for half-year ended Dec. 31, 1929, at the rate of 6 p.ct. per annum, and a dividend for half-year ended June 30, 1930, at the rate of 5 p.ct. per annum; by transferring to special purposes fund the sum of £1962, leaving a balance to be carried forward in profit and loss account of £2398.

The Installation of a Coalite Plant at the Higginshaw Works of the Oldham Gas Department was the suggestion contained in a letter recently submitted by the Town Clerk to the Gas Committee. The letter further stated that the writer hoped that the Gas Committee would appoint a delegate to attend a conference on fuel research and smoke abatement. After careful consideration, instructions were given for the writer to be informed that the subject was receiving every attention, and that the Committee were awaiting the result of Government experiments before taking any further action in the matter.

The Gas Manufactured by the Singapore Gas Department during the year ended Dec. 31, 1929, was 386,326,000 c.ft., against 348,466,000 c.ft. made during 1928—or an increase of 10·8 p.ct. Of this quantity 129,876,780 c.ft. was water gas, equal to 33·6 p.ct. of the make. The cost of manufacture for 1929, including interest, sinking fund, and renewals, was $1·7102, against $1·77 per 1000 c.ft. in 1928. The unaccounted-for gas was equal to 11·4 p.ct. of the make, against 10·4 p.ct. for 1928. The gross profit made by the Department, allowing for public lighting at cost, was $64,107·07, and after deducting interest on loan, sinking fund, and renewal charges, there was a net profit of $150,269·86. Of this amount $106,083·71 was expended on additions of a capital nature to mains, &c., leaving a credit balance of $44,186·15.

Composition of Solid Fuel was the subject of a paper read by Austin Gudmundsen and David F. Smith before the Division of Gas and Fuel Chemistry of the American Chemical Society at their recent Cincinnati meeting, in connection with a new approach to a fundamental study of the subject. The effect of particle size, air velocity, temperature, and humidity on the rate of burning of carbon particles has been investigated under carefully controlled conditions. The method involves bringing accurately shaped and weighed spheres of carbon to a known temperature in an inert gas, suddenly blasting the particle with an air stream of known velocity and temperature for a very short interval, quickly quenching the particle in inert gas, again weighing to determine the amount of reaction, and obtaining careful records of particle surface temperature during the combustion. In all cases, the specific-surface reaction rate increases with increasing particle surface temperature. This temperature coefficient and the specific-surface reaction rate are enormously larger for the smaller particles than for the larger particles. The rate, of course, increases with increasing air velocity. The results obtained were accurately reproducible and throw considerable light on the mechanism of one of the most important industrial reactions—that of the combustion of carbon.

The Ilford Corporation have accepted the tender of the Gas Light and Coke Company to lay all necessary mains on the Fencepiece Estate, and make all connections; carry out work of carcassing; fix automatic prepayment meters, and provide gas cooking-stoves (both of which will remain the property of the Company), and supply and fix a 10-gallon wash-copper in each house, the Council to do the necessary cutting away and making good.

The Course of Lectures on Coal Carbonization by Mr. H. D. Greenwood at the Sir John Cass Technical Institute will again be given during the coming session. During the past year a Committee has been formed to advise on the training in Gas Engineering, Carbonization, &c., at the Institute, Dr. C. H. Lander being the Chairman, and Mr. E. V. Evans the Vice-Chairman. The Committee includes representatives of all the various bodies concerned in the production and utilization of the various types of fuel. It is interesting to note that last session the new degree of M.Sc. (London) in Coal Carbonization was obtained for the first time by one of the students of the Institute. This year the syllabus of lectures is being considerably enlarged, and special lectures are to be given by Prof. J. W. Cobb, Dr. F. S. Sinnatt, Dr. Ivon Graham, and other well-known fuel technologists. Details of these lectures will be given in these columns at a later date. The response which has so far been made to the provision of specialized courses on fuel and allied subjects clearly indicates the need for such facilities.

Prevention of Accidents from falls of ground in coal mines has been for some time the subject of investigation by the Safety in Mines Research Board, and they have just issued their Report on the North of England coalfields. The present report, which is freely illustrated with sketches and plans, describes the usual methods of working, which include a good deal of bord and pillar work and adaptations of bord and pillar to allow for the pillars to be extracted by longwall machine mining. It gives an account of colliery practice as regards the support of the workings, calls attention to the best methods and makes suggestions where improvement seems possible. Besides giving full descriptions of methods of work in which steel supports are being used it deals with many other matters affecting the occurrence of accidents from falls of ground. The Committee conclude with the remark that the best safeguard against accidents is close and systematic support under all conditions whatever the method of work. The report (S.M.R.B. Paper No. 61, H.M. Stationery Office, Adastral House, Kingsway, W.C. 2) is published at the nominal price of 2d. net in order to bring it within the reach of all classes of mine workers.

Health Week and Smoke Prevention.

The following is an extract from an article dealing with atmospheric smoke pollution written by Mr. Percy Alden, Chairman of the Publicity Committee of Health Week, in connection with the forthcoming Health Week (Oct. 5 to 11), organized by a Special Committee of the Royal Sanitary Institute, under the patronage of H.M. the King:

Some 3,000,000 tons of soot are deposited annually throughout the country, and of this huge amount 2,500,000 would be due to the domestic chimney and the remainder to the factory chimney. The cost of renovating government buildings in London alone as a result of this smoke has been over £1,000,000 in recent years, and our Bus Companies during twenty-seven days of fog lost 400,000 working miles. On the score of economy alone we ought to substitute a smokeless fuel for raw coal, and in so doing we should greatly benefit by the increased sunlight, since it is probable that we lose in our big industrial towns more than 50 p.ct. of the sunlight that we ought to receive. The surprising fact is that most of this smoke is unnecessary since we can turn raw coal into gas which can be obtained cheaply by most people for heating and cooking purposes. Electricity, coke, oil, and smokeless coal are also other substitutes for the raw coal which when burnt in kitchen ranges or open grates is both wasteful and injurious.

It is only an infinitesimal part of the light and heat of the sun that we get in this country. It is all the more important then that we should make sure of what there is.

THE NEWS—*continued.*

Recreation Club Opened at Liverpool Works.

On Saturday, Sept. 27, the Chairman of the Liverpool Gas Company (Mr. H. Wade Deacon) opened the Company's Recreation Club's new premises at Garston. Among those present were Mr. R. E. Gibson (Chief Engineer) and a number of other senior officials of the Company.

Mr. W. Taylor, in asking Mr. Wade Deacon formally to open the Club, referred to the fact that the generosity of the Company in giving the land had made it possible for them to construct such suitable premises at Garston for the employees.

Mr. Wade Deacon congratulated the Garston Works on having such convenient clubrooms. The Directors had given them the land, but the employees themselves had undertaken the erection of the building in their spare time, and they had made a very fine job of it.

Mr. Gibson said that although their Garston Works were second only to Linacre at present, the district was developing rapidly, and soon there was a possibility of Garston becoming the largest works of the Company.

The building consists of a large assembly hall, a billiard-room, a number of cloakrooms, and a refreshment bar. The officials in charge of the work were Mr. W. Fletcher (Vice-President), Mr. W. Taylor (Chairman), Mr. J. W. Jones (Treasurer), and Mr. T. Forster (General Secretary), with Messrs. J. Townley, A. Kemp, and S. Milner.

Society of British Gas Industries.

A Meeting of the Council was held at 56, Victoria Street, Westminster, S.W. 1, on Sept. 18—Mr. FRANK WEST, Chairman, presiding. Those present were: Messrs. C. A. Goodall, W. H. Handley, T. O. Wilton, B. B. Waller, G. Ewart, Ernest West, F. C. Tilley, Colonel E. A. Wilson, Dr. E. W. Smith, Mr. F. J. Gould (Hon. Treasurer), Mr. E. J. Davison (Hon. Secretary), and Arthur L. Griffith (Secretary). Apologies for absence were reported from Messrs. D. M. Gibb (Vice-Chairman), R. B. Hodgson, C. R. F. Threlfall, D. W. Turner, A. B. Balmford, L. Hartley H. E. Bennet, H. M. Thornton, R. J. Milbourne, T. A. Clapham, and W. J. D. Howell.

An application for membership was submitted from the Oxley Engineering Company, Ltd., Hunslet, Leeds, and they were elected members of the Society under Sections 2, 4, and 12.

Matters in connection with the British Industries Fair, Birmingham, 1931, Gas Industries Section, were reported.

The papers submitted by the Gas Salesmen's Circles for the award of the Society's Gold Medal were considered, and arrangements made for the adjudication of same.

It was decided that the Society's Medal should be presented at the Autumn General Meeting in London on Nov. 19.

The names of the candidates recommended for the prizes offered by the Society in the City and Guilds of London Institute Examinations upon the results of the final examinations of the Institute in Gas-Works Practice, Gas Supply Practice, and Gas Fitting, were reported, and the awards confirmed.

Annual Local Taxation Returns.

Part II. of the Annual Local Taxation Returns for England and Wales in respect of the financial year 1927-28 deals with the trading income and expenditure of County Boroughs and Councils, and the following comparative figures relating to public supply undertakings owned by the 115 local authorities included in the Return are extremely interesting.

—	Gas.	Water.	Electricity.
	£	£	£
Water rates, gas rentals, and other trading income	12,946,622	6,937,450	16,133,346
Exchequer grants	17,652	46,009	88,905
Income from work done or materials supplied to other services, and other local authorities	618,932	641,776	2,306,010
Sums transferred from reserves and other funds (other than rate funds)	65,044	31,353	9,460
	£13,648,250	£7,656,588	£18,537,721
	£	£	£
Working expenses	10,407,061	3,803,725	10,651,659
Loan charges	1,802,213	3,893,822	5,793,046
Transfers to reserves and other funds (other than rate funds)	535,839	181,569	1,054,275
	£12,745,113	£7,879,116	£17,498,980
	£	£	£
Surplus profits carried in aid of rate funds	136,139	54,278	349,002
Deficiencies met from rate funds	..	328,298	35,000

From this table it will be seen that, in the case of the trading departments included in this summary, the excess of gas and electricity rentals (receipts) and other income over working expenses and loan charges amounted to £1,373,93[illegible] and £2,083,556 respectively, while approximately 10 p.ct. of such surplus profits in the case of gas undertakings and 15 p.ct. in the case of electricity undertakings was applied in aid of County Borough Councils' Rate Funds.

British Commercial Gas Association.

Programme of Annual Meeting, Oct. 27, 28, and 29.

The following programme has been arranged for the Nineteenth Annual General Meeting and Conference of the British Commercial Gas Association, to be held at Hull and Bridlington on Monday, Tuesday, and Wednesday, Oct. 27, 28, and 29, under the Presidency of Mr. Henry Woodall, J.P., M.Inst.C.E., Chairman of the British Gas Light Company, Ltd.

Monday, Oct. 27.

Evening.

Reception and Lecture in the City Hall, Hull.

7.30 p.m. Reception by the Lord Mayor of Hull (Councillor R. Richardson, J.P.).

8.15 p.m. Lecture by Dr. C. W. Saleeby, F.R.S. (Edin.), on "Sunlight and Health."

During the evening there will be a short organ recital by Mr. Frank H. Robinson, Assoc.M Inst.C.E., of Harrogate.

Evening dress. Light refreshments. Carriages 10.30 p.m.

Tuesday, Oct. 28.

Morning.

Business Conference in the Grand Pavilion, Bridlington.

10.0 a.m. Assembly of Members.
Welcome by His Worship the Mayor of Bridlington (Alderman H. Harker, J.P.).
Presentation of annual report and statement of accounts by the Executive Chairman, Sir Francis Goodenough, C.B.E.
Presidential Address by Mr. Henry Woodall, M.Inst.C.E.
Paper by Dr. Elizabeth C. Mudie on "A Woman Doctor's Views on Gas in Relation to Hygiene."

12.30 p.m. Adjournment.

1.0 p.m. Complimentary luncheon to Sir Francis Goodenough, C.B.E., in the Alexandra Hotel, Bridlington.

Afternoon.

In the Grand Pavilion, Bridlington.

2.30 p.m. Resumption of Conference.
Opening remarks by the President of the Conference.
Paper by Mr. Harold E. Copp, M.Inst.C.E. (President of the Institution of Gas Engineers), on "Service to the Consumer."
Followed by discussion.
Paper by Mr. H. H. Creasey (Manager of the Special Service Section of the Gas Sales Department of the Gas Light and Coke Company), on "The Sale of Gas for Industrial Purposes."
Followed by discussion.

5.0 p.m. Adjournment.

Evening.

7.30 for 7.45 p.m. Dinner by invitation of the Chairman and Directors of the British Gas Light Company, Ltd., in the Banqueting Chamber, Guildhall, Hull.

7.30 p.m. Reception of guests by the President.
Evening dress.

Wednesday, Oct. 29.

Morning.

Business Conference in the Assembly Hall, University College, Hull.

10.0 a.m. Assembly of Members.
Opening remarks by the President of the Conference.
Address by Principal A. E. Morgan, M.A. (Principal of University College, Hull), on "Education for Commerce and Industry."
Followed by Sir Francis Goodenough, C.B.E., and Mr. Harold Whitehead (Former Head of the Department of Sales Relations, College of Business Administration, Boston University), who will deal particularly with a scheme for "The Education of the Gas Salesman."
[Mr. Whitehead, a native of Birmingham, played a leading part in planning and carrying through the scheme for the Education of Salesmen for the American Gas Association.]
Paper by Alderman J. H. Lloyd, M.A. (Chairman of the City of Birmingham Gas Committee), on "Gas as a Public Service from the Municipal Point of View"—What the Gas Industry does for Municipalities, and What Municipalities can do for the Gas Industry.

12.30 p.m. Adjournment.

1.0 p.m. Luncheon in Works Dining Hall, Gas-Works, Sculcoates, Hull, by invitation of the President-Elect, the Vice-Presidents, and Members of the Association to the retiring President and the Directors of the British Gas Light Company, Ltd.

Close of Conference.

2.30 p.m. Visits to—
(*a*) The Gas-Works, Sculcoates, Hull.
(*b*) The Gas Showrooms, Prospect Street, Hull.

A Bright Improvement.

Enhancing the Virtues of Gas Heating.

After exhaustive experiments over a period of years, Messrs. Stoves, Ltd., of Rainhill, have produced a gas fire radiant of pleasing design and high efficiency. The material of which this radiant is composed is a new fireclay, for which the makers put forward many claims, chief among which are the beneficial type of heat rays which it emits, the high thermal efficiency, and the fact that it is "semi-solid." Apart from the necessary air vents, the back of this radiant, which is known as the "Silo," is solid, and presents a large radiating surface. The accompanying illustration gives a good idea of the design of the "Silo."

The makers, however, did not rest content with merely marketing the new design of radiant; they went a step further, and concentrated their attention on producing a form of fireclay of such composition as would enhance the appearance of the lighted fire. The outcome of this work is the "Briteray Silo," which was demonstrated to us last week. The merits of the "Briteray" are a really bright appearance, a better heating effect, and the instantaneous heating-up of the radiant to the extreme top. Immediately the fire is lighted, not only warmth, but cheerful warmth, is obtained. The effect is astonishingly good, and the "Briteray Silo" is calculated still further to popularize gas heating and to impress upon the public the modernity of our industry. Fitted with the new "Century" lighter attachment which was described and illustrated in the "Journal" for Sept. 17, and the new radiant, the makers' claim that they are marketing a gas fire modern in every sense is certainly well justified. The "Briteray Silo" which is sold under the licence of Mr. Luckhurst's provisional patent, is obtainable from Stoves, Ltd., and from Messrs. Falk, Stadelmann, & Co., Ltd., 83-93, Farringdon Road, E.C. 1.

A Satisfactory Half-Year in Melbourne.

The One Hundred and Fifth Half-Yearly Meeting of the Metropolitan Gas Company of Melbourne was held on July 28 last at the Offices of the Company—Sir John Grice, Chairman of Directors, presiding.

The Chairman, in moving the adoption of the report and accounts, stated that the sales of gas were 2,022,371,000 c.ft., with a revenue of £755,925, compared with 2,041,451,000 c.ft., and £721,533 for the six months ended June 30, 1929. The output was lower by 19,080,000 c.ft., or 0·935 p.ct.—a fact due to the continued depression. Receipts from residuals, £120,398, were lower by £6530 than for the June half of 1929. Tar sales amounted to nearly 2¼ million gallons—an increase of 160,000 gallons on the quantity sold in the June half of 1929. Satisfactory progress was being made in extending the sales for "Bitural"—the improved tar product for road-making purposes.

The profits for the half-year were £94,327. From this amount it was decided to transfer to capital account £8451, and also transfer from suspense account to capital account profit on sale of lands amounting to £13,586, which two amounts together total £22,038, being the balance standing in the Company's books in connection with the inclined retort house at Fitzroy condemned as obsolete by the Engineer. The sum of £36,184 was debited to net revenue account last half-year on account of this particular plant. It was recommended that payment of a dividend at the rate of 6s. 6d. per share be authorized. After appropriations, the sum of £1375 remained to be added to the carry forward.

During the period under review a number of large kitchens had been supplied with gas cooking appliances, and a pleasing feature was the further establishment of the gas steam radiator as a means of heating in large buildings. These radiators were being specified by leading architects, and had been adopted by several prominent manufacturers in Melbourne for factory heating. This system commended itself because of its low initial, running, and maintenance costs, as compared with other steam heating systems. During the half-year a total of 144 radiators was installed.

Cookery demonstrations, in addition to that held regularly each week at Head Office, had been continued in various suburban centres. Very keen interest was shown at the demonstrations, and at the conclusion of each a brief address on the advantages of using gas appliances was given. To ensure best results in the use of gas cookery, 2283 consumers' homes were visited and instruction given where necessary.

The Chairman then moved the adoption of the report and balance-sheet. The motion was seconded by Mr. J. M. Campbell and carried unanimously.

THE NEWS—*continued.*

Probable Price Increase at Coventry.

[From the "Birmingham Post."]

An increase in the price of gas at Coventry, at an early date, is foreshadowed in the recommendation of the Gas Committee asking the City Council to bring into operation after the September readings of the meters, a revised scale of charges, estimated to produce an increase in revenue of £33,493.

The Bedworth and Kenilworth gas areas, now supplied by Coventry, are exempt from the recommendation, the charges in the case of the former being already at the authorized maximum, and in the Kenilworth area in excess of the charges in the Corporation's general areas of supply.

On quarterly accounts, up to a consumption of 100,000 c.ft. of gas, it is proposed to increase the charges from 3s. 3·84d. to 3s. 7·2d. per 1000 c.ft. Above that consumption the increases are in proportion to the existing charges. Similar increases are proposed in the case of monthly accounts, and in the case of prepayment meters the increase in price is from 3s. 5·76d. to 3s. 9·12d. per 1000 c.ft. It is also recommended that the matter be further considered at the end of six months.

The Gas Engineer (Mr. P. N. Langford) estimates that as a result of the increased cost of coal, the decreased receipts from the sale of residuals, the decreased sales of gas, and the additional capital charges, the revenue for the current year if the existing charges were continued, would be £32,300 lower than last year.

The City Council are also asked to approve an application to the Ministry of Health for sanction to a loan of £100,000 for gas main extensions during the ensuing five years and to cover the expenditure incurred on mains during the present year. It has been the practice in the past to meet a large proportion of mains expenditure out of revenue, but in 1929-30 this was found impracticable in respect of a total of £23,000.

Colonial Gas Association Report.

The Directors of the Colonial Gas Association present the following report respecting the operations of the Association during the year ended June 30, 1930:

After providing for depreciation, &c., the balance at credit of revenue account is £112,474. Adding the balance brought forward from last year—viz., £14,130—and deducting bank, loan, and debenture interest, and after payment of interim dividend of 4 p.ct. and 4½ p.ct. paid in April last on the preference and ordinary shares respectively, the amount at credit of the net revenue account is £60,287. The Directors recommend as follows:

(*a*) That a dividend at the rate of 8 p.ct. per annum (less interim dividend of 4 p.ct. for the half-year ended Dec. 31, 1929) be paid on the preference shares;

(*b*) That a dividend at the rate of 8 p.ct. per annum (less interim dividend of 4½ p.ct. for the half-year ended Dec. 31, 1929) be paid on the ordinary shares;

(*c*) That £8000 be set aside for Australian income-tax on profits earned to June 30, 1930; and

(*d*) That the balance, approximately £19,114, be carried forward to the next account.

The sales of gas show an increase of 2·8 p.ct. over the sales for the preceding year, and the sales of gas for the subsidiary companies an increase of 3·7 p.ct. The Report further indicates that a charge of £9430 has been made against the reserve fund to meet the exceptional cost of coal owing to the mines being closed for 11 months of the financial year.

The Report also mentions that the price of gas was increased by 5d. per 1000 c.ft. in January last at the Boxhill, Footscray, and Oakleigh Works, being reduced the following September by 6d. per 1000 c.ft.

During the year the 5 p.ct. and 8½ p.ct. 1930 £100 debentures matured, and arrangements were made for the repayment or extension of these debentures. Also, two 8½ p.ct. (1935) £50 debentures and 174 7½ p.ct. (1935) £100 debentures were cancelled, and ordinary shares were allotted in exchange therefor.

During the year a new 300,000 c.ft. gasholder was erected at Boxhill, this being in full operation at the beginning of March last.

A resolution will be submitted to the shareholders at the meeting for the creation of 45,000 additional preference shares and 40,000 additional ordinary shares, all of £1 each.

THE NEWS—continued.

Corporation Undertakings' Results.

Ellesmere Port and Whitby.

The annual report for the year ended March 31, 1930, shows that the unaccounted-for gas figure has greatly increased over last year's figure, but, in the Engineer's opinion, this is accounted for chiefly by the larger amount of money lying in prepayment meters this year as compared with last year, the number fixed during the year being over 550; and a second contributory cause in a lesser degree is the large amount of main and service laying done during the year, which always results in a loss of gas. During the year 8450 tons of coal were received, 7822 tons being carbonized and 12 tons sold. The total appliances fixed during the year were as follows: Cookers, 570; fires, 157; boilers, 348; irons, 4; boiling rings, 120; grillers, 16; radiators, 4; hotplates, 3; shop lamps, 2; a total of 1224 appliances.

Teignmouth.

The gross profit for the year, after paying £759 income-tax, is £2788, which falls short of the interest on capital and repayment of capital by £1091, and by that amount the credit balance is reduced. This credit balance now stands, therefore, at £3401. The loss is chiefly caused by the heavy increase in the rates payable on the new assessment of the undertaking, which now amount to £1235 against the previous year's figure of £600. The total gross income of the Department was £26,156, from which rebate was allowed to the amount of £1590, leaving a net income of £24,566. The total expenditure was £25,657. The total increased sale of gas for the year amounted to 6·5 p.ct. The number of consumers increased by 58 to a total of 2534. The total sale of gas was 85,536,000 c.ft., or 384,912 therms. The amount of coal carbonized was 4930 tons, while 574 tons of coke and 23,782 gallons of oil were used for manufacture of carburetted water gas. Gas appliances sold were as follows: 88 cookers, 101 fires, 7 radiators, 46 boilers, 8 geysers, and sundry small sales of a total value of £2400 against last year sales value of £2750. Since the introduction of electricity into the town in September, 1922, the sales of gas have gone up from 56 million c.ft. to 85 million c.ft. —an increase of over 50 p.ct.

Polish Gas and Water Works Engineers.

The Twelfth Annual Meeting of the Polish Gas and Water Works Engineers was held at Drohobycz on May 8-11. Over two hundred engineers and scientists from all parts of Poland took part in the meeting. There were also representatives of the Ministries, Army, Government, and Municipal Institutions, and a delegate of the Czechoslovakian Association of Gas and Water Works Engineers.

Under the guidance of the Chairman of the Union of Gas and Water Works Engineers, Eng. Czeslaw Swierczewski, who was celebrating his forty years' work in gas service, the discussions concentrated mainly on the problem of long-distance supply of gas and water. Several scientific and economics lectures were given, and the problem of distribution of coke oven gas from Upper Silesia in the direction of Czestochowa, Cracow and Tarnow, Bielsk, Cieszyn, and Lubliniec, according to the project of Engineer Konopka and Director Engineer Szulc, was discussed.

During the meeting there were general assemblies of the Association of Gas and Water Works Engineers in Poland, under the Chairmanship of President Swierczewski, and of the Economical Union of Gas and Water Works, under the Chairmanship of President Dziurzynski of Poznan. Those who attended the meeting also took part in excursions to Boryslaw, where oil mines were inspected, as well as to Daszawa, whence, since 1928, gas has been conducted to Lwow, situated 70 kilometres distant.

ON THE ELECTRICAL SIDE

How to Get a Supply of Current.

Proceedings have been taking place in connection with an inquiry into the proposed electrification of a large part of East Leicestershire and parts of Rutland, Lincolnshire, and Northamptonshire. The area in question is a large one with a population of only 94 to the square mile, but there is a desire in several quarters to supply this population with electricity. Nearly 600 square miles are involved, comprising seventeen rural districts, and 13,682 occupied dwellings. Thirteen of these rural districts gave their consent to an "original scheme," one remained neutral, and three opposed it. Mr. Craig Henderson, who appeared at the inquiry in support of the original scheme, said it was really a question which of the authorities could best supply what he might describe as a truly rural area, including as it did, some of the best grass country in England, if not in the world, and the hunting country of the Quorn, the Cottesmore, and the Belvoir. His application was to deal with the area as a whole—the opponents only dealt with certain portions—and he contended that it would be unfair to allow others to take the more profitable districts, and leave the rural districts, which would pay the least. The original scheme would include facilities for the supply of electricity to every village of even twenty houses, and would make a supply possible to 92 p.ct. of the population. The maximum price, flat rate, would be 10d.; the actual flat rate probably would be 8d. But the intention was to develop the two-part tariff, based on the size of the house or the farm, with a lump sum a year, and a small sum per unit. For instance, the suggestion in the case of a farm with not less than 25 p.ct. arable land was to charge 3s. 6d. an acre arable land, *plus* 1d. a unit.

An engineering witness for the original scheme agreed that certain Power Companies have mains close on the borders of the proposed area, but said that if one of these Companies were granted the facilities they desired, it would be to the detriment of the remainder of the scheme. The following question and answer are recorded: Mr. Craig Henderson: They say a supply of electricity will be forthcoming as and when required. What does that mean? Witness: When sufficient customers made sufficient noise, they might get a supply.

The Size of House Basis.

It will be noted that in the above scheme it is proposed to develop a two-part tariff based on the size of the house or the farm, and not on the rateable value. In this way the basis will remain fixed until the premises are enlarged; whereas under the rateable value arrangements, as the rateable value would be subject to revision at intervals, presumably the service charge might be a changing quantity, though the consumer would be unlikely to add to his consumption of current merely because the rateable value of his premises had been raised.

Hire-Purchase Agreements.

A knotty point arising out of a hire-purchase agreement, which, though it related to the sale of a vacuum cleaner, might conceivably present itself in connection with other agreements containing a penalty clause, was lately decided in Scotland. The question was whether a wife binds her husband by signing an agreement which contains a penalty clause, and the decision was that she does not. A representative called on a man's wife while the husband was from home, and obtained her signature to a hire-purchase agreement for a vacuum cleaner. The husband, on returning home, repudiated the agreement, and the cleaner was sent back. He was sued under a condition of the agreement which made the contracting party responsible for a minimum sum of £3 if the agreement was repudiated before the final payment was made. The Judge remarked that he had not come across such an arrangement in the numerous cases of hire-purchase with which he had dealt, and he was not sure that it was a very fair clause; but no doubt it would be enforceable directly against the party contracted with. He did not, however, think it was a condition to which the wife was entitled to bind her husband.

Finding Work for the Unemployed.

It is reported that several remote villages in North-West Durham, which are now illuminated by other means, will soon have electric light. A scheme is to be carried out in the near future by the Lanchester Rural District Council, in order to find work for the unemployed. Castleside, which has a population of more than 2000, is one of the villages to come within the scope of the scheme. At present it is served by one acetylene lamp. Three years ago Castleside had no lamps, but then the Lanchester Rural District Council placed two acetylene lamps in the centre of the village. A short time ago a motor knocked down one of the lamps, and since then the village has had to rely upon the remaining one.

Electricity in August.

From the official returns to the Electricity Commissioners, it is gathered that 721 million units of electricity were generated by authorized undertakers in Great Britain during the month of August, as compared with 706 million units in the corresponding month of 1929, or an increase of 2·1 p.ct. During the eight months of 1930, up to the end of August, the total amount of electricity generated by authorized undertakers was 6888 million units, as compared with 6536 million units for the corresponding period of last year, representing an increase of 5·4 p.ct.

TRAINING WORK AT WATSON HOUSE - - -

Watson House was inaugurated in 1926, and four years of intensive development has resulted in a system of gas education which is a model to the industry of this country. Our account of the scope of the scheme at present will, we suggest, prove of value to all engaged in staff training.

To-day the entire training and education of employees of the Gas Light and Coke Company who are engaged, or destined to be engaged, in the Gas Sales Department are controlled from Watson House. This extensive work may broadly be divided into six sections :

Gasfitter Apprenticeship Scheme.
Training of " staff pupils."
Education of " staff trainees."
Training of foremen, fitters, and assistant fitters of all grades.
Special courses for inspectors and their assistants, foremen, and showroom attendants.
Supervision of all employees attending courses, and liaison with the Education Authorities in the Company's area of supply.

The Apprenticeship Scheme.

Actually, the apprenticeship scheme of the Gas Light and Coke Company came of age in January last. At present there are many boys in training, and the Company are annually taking between sixty and eighty. The term is one of six years. Boys commence at the age of fourteen, and are fully indentured. Their educational qualification is that of the Seventh Standard of an Elementary School; and before acceptable they have to undergo an entrance examination and also a medical test. The first two years are spent in the shops at Watson House, concurrently with three months at the stove and meter shops, where they are trained in the repair, assembly, and regulation of cooking and heating appliances. And throughout this period they spend one day per week at the Westminster Technical Institute. It is during the first two years that they take the Grade I. Examination in Gas Fitting of the City and Guilds of London Institute. At Watson House they are given practical training and lectures in all branches of Gas Fitting, including :

Lead pipe bending; lead joint making; carpentry; forge work; resetting and repairing tools; precision filing; tinsmith's work; brass turning and finishing; dismantling, repairing, and re-assembling lamps; preparing moulds and casting in brass, aluminium, &c.; dipping, plating, and finishing; lacquering and polishing; forge work in iron and steel; making chisels, wedges, and tempering tools; wheelwright's shop; thread making by power driven machines; examination and testing of fittings; working coke boilers; main laying; cutting out and inserting branch mains; connecting service pipes to mains; fixing meters; running gas supplies, &c.

In the third year, the apprentices spend six months in the Industrial Appliance Workshops and Demonstration Showrooms, during which time they are employed on the manufacture and erection of all types of industrial appliances. After this they proceed to the district proper, where, under the guidance of a fitter, they attend to escapes, defective supplies, exchange of meters, and so on. This period of experience is followed by two months with a fitter on the maintenance of street lamps, burners, &c.; two months with a fitter on stove inspection and maintenance, and on repairing and adjusting consumers' appliances; and two months with a fitter on the inspection and maintenance of hot water appliances. In this case also they attend day classes at the Westminster Technical Institute, and evening classes are arranged according to individual progress.

During the fourth, fifth, and sixth years, the apprentices are attached to a District Office, working with fitters, when opportunities are given for gaining experience in all classes of fitters' work. The youths at the same time undergo evening instruction at a Technical Institute, and take Grade II. and Final Examinations in Gas Fitting of the City and Guilds of London Institute. It is during this period that selected boys are transferred to " Gas Supply " classes, when they undergo training for the Minor and Major Courses of the Institution of Gas Engineers, with whom we will deal next. Before doing so, however, we must mention that throughout the training apprentices are paid a progressive rate of wages, receiving annual increases depending on their general progress. It is of course realized that a plan on these lines is not applicable to any but the largest undertaking, but, nevertheless, the information set out should serve as a guide to any undertaking that may be planning a similar though smaller scheme.

APPRENTICES' WORKSHOP—BENDING LEAD AND BLOWING JOINTS.

Staff Pupils.

The raw material for this section of the training work at Watson House consists of boys from public and secondary schools who have reached Matriculation standard, or its equivalent. They are articled, and the period of training extends over four years. This training covers a wide field, and comprises experience in the workshops at Watson House, with the Distribution Department, with the Divisional Mains Superintendent, with the District Inspectors, with the Special Service Section, in the laboratories at Watson House, in the Industrial Appliance Workshops and Demonstration Showrooms at Goswell Road, and with the Administrative Staff of the Gas Sales Department. The articled pupils have to take the Major Course in Gas Supply of the Institution of Gas

Engineers, and must obtain a First Class Certificate in the Higher Examination.

"STAFF TRAINEES."

A number of the junior members of the staff are selected annually to undergo a special concentrated course of training at Watson House and on the district. Normally they are of Matriculation standard and have obtained the Ordinary Grade Certificate in Gas Supply of the Institution of Gas Engineers. They have, of course, already had considerable experience in the work of the Department, but they require workshop and fitting training to enable them to qualify for district work.

THE TRAINING OF FITTERS.

In the light of several years' experience, the training work at Watson House has been correlated with the facilities given

Lecture Room, Showing a Section of Apprentices.

for study at the various technical institutes in the Company's area of supply. The courses for gasfitters are divided broadly into two categories—those designed to qualify men for promotion to higher rank, and those designed as "refresher courses." The Superintendent of Labour is responsible for arranging the groups of men to attend at Watson House, and for deciding what courses of instruction individual men shall attend. In making his decisions he takes into consideration the recommendations of Local Managers and Inspectors-in-Charge, and also is influenced by the extent to which each man has taken advantage of the opportunities to obtain technical education offered by the various technical institutes, and his progress therein, together with the labour requirements of the Company generally.

It is hoped eventually to arrange that every assistant fitter shall pass through courses "A," "B," and "C" (outlined later), as part of his normal training, irrespective of whether he is to be employed on any form of maintenance work or not. It is further contemplated that a pass in Courses "A," "B," and "C" will be necessary for a man to become eligible for selection for Courses "E" or "F." To qualify in any given courses does not imply immediate promotion to the rank concerned, but it does mean that the man is eligible for appointment on recommendation by the Local Manager or Inspector-in-Charge when a vacancy in that rank occurs. Men are not sent to Watson House for Courses "A," "B," and "C" until they have at least one year's service.

Course "D" is designed not as one to teach joint wiping, but to supplement and test the knowledge and skill already gained in this subject at a technical institute. All men in turn attend "refresher" courses. The following is a schedule of the courses of training at Watson House, qualification in which is necessary for appointment for promotion to higher rank. Each course occupies one week.

Course "A."—Lighting burners and lamps; fires; flueless heaters. This is arranged for assistant fitters to qualify for employment on mantle maintenance and/or fire maintenance work, and also for mantle maintenance fitters to qualify for employment on fire maintenance work.

Course "B."—Cooking apparatus; water heaters other than geysers. This is for assistant fitters and mantle maintenance and fire maintenance fitters, to qualify for employment on cooker and boiler maintenance work.

Course "C."—Geysers. This course is designed to enable assistant fitters and mantle maintenance, fire maintenance, and stove maintenance fitters to qualify for employment on geyser maintenance work, and also for revenue and district fitters to qualify for employment on geyser fixing work.

Course "D."—Joint wiping. This is for revenue and district fitters to qualify for employment on geyser fixing work provided they have obtained a pass in Course "C." A "geyser fixer" must be a revenue or district fitter who has obtained a pass in Courses "C" and "D."

Course "E."—Installation work (primary). This course is for assistant fitters and mantle maintenance, fire maintenance, and stove maintenance fitters who have not obtained the City and Guilds of London Institute Gas Fitting, Grade II., Certificate.

Course "F."—Installation work (secondary). This has been arranged for assistant fitters and mantle maintenance, fire maintenance, and stove maintenance fitters who have obtained a pass in Course "E" or have obtained the City and Guilds of London Gas Fitting, Grade II. or Final, Certificates. A pass in Course "F" is necessary to qualify for employment as a district or revenue fitter.

Assistant fitters must have been employed for at least two years in such rank before they can be accepted for Courses "E" and/or "F;" while mantle maintenance, fire maintenance, and stove maintenance fitters must, within a period of six years from the commencement of the Course, have been employed for at least one year as assistant fitters before they can be accepted for Courses "E" and/or "F." (Special consideration is given to the cases of specially recommended men who have not this qualification.)

We give the syllabuses of these courses, which are kept up-to-date. Each course lasts a week.

Course "A."—Practical Work: Construction and assembly of all types of lighting burners and lamps, high and low pressure; construction, fitting, and replacing of mantles; adjustment and regulation of burners; distant controls; construction, dismantling, cleaning, and re-assembling of all types of fires and flueless heaters. *Lectures:* Combustion and ventilation as applied to lighting burners, fires, and flueless heaters; the bunsen burner and luminous flames; condensation; elementary theory of illumination.

Course "B."—Practical Work: Examination, dismantling, cleaning, and re-assembling of all types of cooking apparatus and water heaters other than geysers; adjusting and regulating bunsen and luminous burners; testing thermostats and cut-off valves; removal of deposit from boilers; use of Cozens solution; renewing manhole washers and making water-tight joints. *Lectures:* Combustion and ventilation; thermostats; cooker ovens; hotplate burners and bars; thermal storage heaters; hot water circulation.

Course "C."—Practical Work: Dismantling, cleaning, repairing, and re-assembling of all types of approved geysers; fixing geysers; flue pipe equipment; brackets; shelves; condensation pipes; window boards; flue terminals; regulating gas and water supplies. *Lectures:* Combustion, ventilation, and flames as applied to geysers; flue pipe equipment; bafflers; terminals; down-blow and down-draught; condensation; positions for geysers; pressure required to operate various valves; regulations of water authorities with regard to fixing geysers on main, &c.

Course "D."—Practical Work Only: Preparing and wiping lead-to-lead and lead-to-brass joints of all types and in all positions.

Course "E."—Practical Work: Joint blowing and lead pipe bending; cutting and screwing barrel to dimensions; bending wrought-iron tubing in forge for seis, lamp arms, &c.; meter fixing and by-passing; running supplies to, fixing, and regulating cookers, flueless heaters, inside and outside lamps, fires, &c.; taking pressures for locating defects in supplies; using pressure gauge for testing installations for soundness; construction and adjustment of thermostats; setting governors. *Lectures:* Pressure; use of pressure gauge and pressure recorders; services; working with live gas; elementary

Fitters' Training Shop, showing a group of men on cooker maintenance work.

considerations of factors affecting flow of gas in pipes; bunsen and luminous flames; flame temperature and flame contact; products of combustion; causes and prevention of incomplete combustion; meter reading; the therm; brief explanation of Board of Trade and municipal regulations with regard to meters; flue pipes, bafflers, and terminals.

Course "F."—Practical Work: Practical work is similar to that for Course "E," except that the work is on larger pipes, and includes such items as fixing large meters, fixing and adjusting distant controls for lighting fittings; running concealed connections to gas fires; dismantling and adjusting thermostats; and lagging hot water installations. *Lectures:* These follow the same lines as outlined for Course "E," but are of a more advanced nature.

"REFRESHER" COURSES.

These courses follow practically the same lines as the courses outlined above. They become essential in order that all fitters shall be conversant with developments as they occur. A new

appliance may be marketed, for instance, or a modification may be effected in what, before the advent of new knowledge, was considered the best. In other words, all employees are kept thoroughly up-to-date. The courses also serve to crystallize anew knowledge formerly gained.

Staff Education.

Special courses of lectures are arranged for inspectors and their assistants, foremen, showroom attendants, and so on, to keep them abreast of the latest practice of the Company and of the gas industry generally. Conclusions drawn from the research work carried out in the laboratories at Watson House are made available, and new appliances are reviewed.

Finally, one of the most important phases of the work undertaken at Watson House is the supervision of all employees attending courses of instruction in gas supply subjects. Last year no fewer than 1500 employees of the Gas Sales Department of the Gas Light and Coke Company attended evening class tuition at various centres. Watson House advises these students as to the best courses to adopt, and where to receive the instruction; and a record is kept of their progress. As an indication of the help which the Company renders to its employees whose courses are approved, we may mention not only that students who attend 80 p.ct. of the prescribed classes receive their tuition free, but that the Company also pay such students' travelling expenses.

GENERAL NOTIFICATION OF THE GAS REFEREES.

A revised issue of the General Notification of the Gas Referees has been published by H.M. Stationery Office and is now on sale, price 2s. 6d. net, which is an increase of 1s. on the price of the previous issue. The instructions given in it are to come into force as from Oct. 1.

The present re-issue supersedes one which has been in force since May 1, 1929. The greater part of the matter remains unchanged, but there is some rearrangement, and the table of contents has been made more compact notwithstanding that additional sub-headings have been included in it. The most significant of the changes introduced in the present re-issue are believed to be included in the following review of the document.

In the preamble relating to the Appointment and Duties of the Gas Referees, reference is now made to the amendment under the Gas Undertakings Act, 1929, of Section 1 (7) (misprinted as Section 5 (7)) of the original Act of 1920, by which amendment the Gas Referees prescribe exceptions to the definition of the calorific value of gas when, owing to the introduction of dry gas processes, the gas as measured to the consumers is not saturated with water vapour. It is explained later that such exceptions will be specified in the Special Prescription for the gas undertaking concerned. Incidentally it may be observed that throughout the new document the heading "Gas Undertakings Acts, 1920 and 1929," takes the place of the former heading "Gas Regulation Act, 1920."

Under the heading of "Apparatus to be provided in official testing places," an innovation is a pressure gauge to show the pressure at the outlet of the service governor. A cross reference discloses that the experimental meter for official calorimetry must now be either of the Hyde Modified type or of the Boys Bell type, in both of which there is an upturned indicating point which is set by a certified gauge to the height at which the water-level must stand in order that the meter shall deliver the correct volume of gas at each revolution. These types of meter were previously optional. It is stated that "these two types of experimental meter admit of the water level being set with a much higher degree of accuracy than the ordinary type, and dispense with the frequent use of the meter-proving measure." The ordinary experimental meters hitherto in use may be retained, however, until they need overhaul. In regard to the testing apparatus, the Gas Examiner is now asked to "report to the Gas Referees should he have reason to doubt the trustworthiness of the apparatus used by him in any testing."

The books and records of official testings remain in the custody of the Gas Examiner, and hitherto only the gas undertakers have been allowed access to them for the purposes of an appeal. The re-issue, however, gives similar access to these documents to representatives of the respondents (*e.g.*, the local authorities) to any appeal.

There are a few significant alterations in the spread-over of the times of testing for calorific value in the quarter. For instance, where it was formerly stated that testings shall be made on not less than *x* days in each calendar week, it is now stated that they shall be made on not less than the same number of days in each of *twelve* calendar weeks in the quarter. This alteration leaves it open to the Gas Examiner to transfer the testings which he would have made in one of the thirteen weeks to one or other of the other twelve weeks in the quarter. Previously, in festing places for which testings are prescribed to be made on not less than seven but less than twenty-six days in each quarter, an interval of thirty-one days was allowed in the third quarter of the year—obviously to facilitate the holiday arrangements of the Gas Examiner. Now the interval is permitted in either the second or third quarter (but not both). The frailties of Gas Examiners are also borne in mind in a new paragraph to the following effect: "In any quarter in which a Gas Examiner has been prevented by illness or other unavoidable cause from making the full number of testings prescribed for the quarter, he shall report the circumstances on his 'Return of Testings' (*vide infra*) to the Gas Referees, who will give their ruling as to whether the average calorific value of the gas supplied in that quarter can be ascertained in manner prescribed by them." Under the heading "Appointment of Gas Examiners" a reference is introduced to the amendment made under the 1929 Act of section 4 (3) (*b*) of the 1920 Act, whereby the County Councils are given more extended powers in regard to the appointment of Gas Examiners.

The instructions for testing the pressure of the gas are substantially unchanged, the only noteworthy point being that pressure registers, where provided, must be made dead-beat. Means of doing this are indicated. There are also a few changes in the manner of reporting results obtained with pressure registers.

Instructions for testing the purity of the gas are changed in one important respect—namely, the slips of lead paper are now 2 in. by 1 in., instead of 2 in. by ½ in. as formerly, and are to be creased longitudinally. The number of slips, and the conditions in other respects of carrying out the test for sulphuretted hydrogen are unaltered; consequently the change means that twice the area of lead paper is now exposed for the same time to the same volume of gas. At first glance the change might be taken to connote increased severity of the test, but the latest literature shows that in reality the effect is to reduce the stringency. This change may be taken as a reflection of the suggestions of the National Fuel and Power Committee in their second Report, in which it was said "The Gas-Works Clauses Act, 1871, contemplated that no trace of sulphuretted hydrogen should be present when tested in the manner provided by that Act, and we should regard any amendment of this provision as a retrograde step. Nevertheless we suggest that if any alleviation is possible in regard to the method of testing prescribed by the Gas Referees consistent with the retention of existing principles, representation should be made to the Referees to exercise a discretionary power in this respect."

The requirements as to apparatus for testing for calorific value do not appear to be fundamentally altered, though considerable rearrangement of the paragraphs in this section of the General Notification has taken place. Some former hard-and-fast lines have been modified—*e.g.*, the differentiation between the provision of a recording or a non-recording calorimeter for official testings, which was formerly made according to whether the gas undertakers sold more or less than 250 million c.ft. of gas per annum, has disappeared. The "Sigma B.Th.U." recorder may be used "for adjusting the average calorific value ascertained from the results of testings made with the Boys non-recording calorimeter, according to the fluctuations of calorific value which have been shown by the 'Sigma B.Th.U.' recorder to have taken place in the intervals between those testings." This method of adjusting the average calorific value for the whole of the quarter, should it prove satisfactory in practice, may dispel the apprehension of some of the smaller undertakings in respect of the small number of testings from which the average calorific value for the quarter is now ascertained. It will be recalled that the National Gas Council aimed some time ago at securing a minimum of six testings for the computation of the average for a quarter. It has been generally recognized that as many as six testings per quarter would in many instances bring the Gas

Examiner's fees to a prohibitive figure in relation to the magnitude of the interests involved.

It is to be noted that, since the previous issue of the General Notification, official instructions have been printed and published for the use of the Fairweather recording calorimeter. Instructions for the other two accepted types of recording calorimeter will, it is stated, also shortly be printed and published by H.M. Stationery Office.

There are a great many changes in detail in the Instructions to Gas Examiners for testing the soundness of connections and proving the meters used in non-recording calorimetry. These changes appear to arise through the general adoption of the improved types of experimental meter already referred to.

There is a modification of the method prescribed for ascertaining the average calorific value of the gas for a quarter in testing places in which a recording calorimeter is in use for a part only of the quarter, and in which testings with a non-recording calorimeter are not made every day in the remainder of the quarter. The new method involves a change in the form of weekly report which is used in places where recording calorimeters have been adopted. The new form of report distinguishes between results obtained with a recording calorimeter and those obtained with a non-recorder. The object of these changes appears to be to give the period in any quarter over which a recording calorimeter has been in action the same time-value, when computing the average, as it would have had had the normal number of non-recording testings been made in lieu of the production of a continuous record.

In the paragraph relating to the informal notification of results to the gas undertakers by the Gas Examiner before he leaves the testing place, it is now stated that the delivery to the undertakers of an informal note of a testing does not preclude a second testing of calorific value being made on the same day after an interval of not less than four hours. Once the Gas Examiner's formal "Report" has been issued, however, no further testing may be made on the same day.

The increase from seven to twenty-one days, which the 1929 Act gave in the period within which the gas undertakers may appeal against any Report of an Examiner, has necessitated a corresponding postponement in the earliest date at which the Gas Examiner may issue his Report for the last completed quarter.

A good deal of alteration of detail, consequent on the changes in the procedure already referred to, occurs in some of the Appendices to the Notification. Among points which may be noted are the inclusion for the first time of an illustration of the Hyde Modified meter, with its point-setting gauge, and an illustration of an altered disposition of the stand for the one-twelfth cubic foot meter-prover, with an arrangement of taps on the stand, introduced by Mr. Butterfield, which displaces the former T-piece and also the threeway tap on the inlet of the meter. The concluding Appendix gives a list of recent official publications relating to gas supply, which are obtainable directly from H.M. Stationery Office, Adastral House, Kingsway, W.C., and Branches, or through any bookseller.

The foregoing notice of the principal changes in the present re-issue of the General Notification of the Gas Referees refers only to the changes now made. Any reader who desires to follow more closely the trend of recent alterations in the official Instructions for gas testing should refer also to the review in the "JOURNAL" for May, 1, 1929 (p. 275), for a summary of the much more extensive revision of pre-existing Instructions which was made in the issue of the General Notification which came into force on that date.

SELF-HELP IN THE LIGHTING BUSINESS.

Mr. Frederick Shewring demonstrates that there need not be pessimism about the domestic load if due regard is paid to efficient and artistic fittings.

The question as to whether the home lighting side of our business is worth retaining, or recovering if lost, is really a matter of policy for each undertaking to decide. I know some engineers who long ago decided to let domestic lighting go, and who have concentrated their energies upon selling gas in other channels. Possibly we may live to recognize that they were ploughing new furrows in fields where advancement in gas uses was uncultivated. Their policy may fit their circumstances; and I have infinitely more respect for an individual who has a policy and follows it rigorously, than for an apathetic gesture which leads nowhere.

I hold the opinion that the gas industry can competitively share the lighting of homes throughout the United Kingdom. I also think that the gas industry should regain a portion of interior shop lighting. If a census were taken of shop lighting premises in various towns, and the information relating to the lighting layout was tabulated, there would be revealed many suitable conditions, and many opportunities for the introduction of well-designed gas lamps. The lamps should be fitted with distant control or switch attachment.

At the change-over from gas to electricity a clean sweep is invariably made—our electric friends see to this—and perhaps the shopkeeper's enthusiasm for electricity at the time gives little encouragement to the gas department to submit schemes with the view of sharing the business on competitive terms. When we visualize the past gas lighting of many business premises and compare them with present electric lighting, can we honestly blame consumers for changing over? Gas undertakings deserve the blame if some effort has not been exerted in endeavouring to modernize inefficiently lighted premises. The introduction of, say, some outdoor shop lamps, or a brilliantly lighted window or door entrance of one premises, is often the sheep which leads the flock.

SHOP LIGHTING.

Whenever gas lighting is replaced by electricity the comfort obtained from the warmth of gas is immediately missed. Radiators often have to be installed to supply the loss of warmth. Herein lies an opportunity tactfully to introduce appropriate lighting under suitable conditions, providing light and warmth. If the construction of the building is unfavourable for gas lighting display, it is better not to pursue it.

Last season we introduced distant-controlled lamps in electrically lighted shops, and these lamps were in daily use, morning, afternoon, and night, whenever the weather was chilly or cold. Lamps once installed provide an advertisement for light and warmth, and additional business is almost sure to follow. The harvesting of shop lighting business should preferably be left to one individual who is competent to deal with it. If he treats the subject as a hobby, giving that little extra personal attention, good work will provide its own reward. There is a wide range of excellent lamps manufactured for shop lighting.

HOUSE LIGHTING.

It is obvious that, to make any article well known and appreciated, it is first necessary to create an interest in it, and, secondly, to see that the interest is sustained by the service it can give, or the quality of the article.

Some years ago I set myself the task of endeavouring to retain our lighting load. We advertised for dissatisfied consumers, and gradually got in touch with a number of them. Personal intercourse and reports from the district staff convinced me that, to retain old and secure new business, a reversal of present practice must immediately be instituted. We were handling the best-grade burners of two or three firms; and although these were good from an efficiency standpoint, they were the same pattern burners of years before. They presented no appeal to consumers contemplating a change-over to electricity. To be candid, consumers classed them as a product of the past—a part of the old-fashioned gas-house stock in trade.

A CHANGE IN POLICY ESSENTIAL.

We then adopted the policy of pushing only the bayonet fitting burner, cluster mantles (as against two or three light pendants), bracket type burners for small rooms, passages, &c., and Vitreosil globes. Angle-pattern burners were recommended to replace the upright burner fitting. In fact, we purposely labelled "old fashioned" all other patterns of burner fixed in our district.

The burners were of a particularly neat design, the nipples being constructed to suit our gas and pressure, and made mostly of aluminium. The special features of introduction were appearance, no screws to crack the globes or become fast, cleanliness—no iron or copper salts forming, economy in the use of small mantles, and the subdued light and heat-resisting feature of Vitreosil globes. The cost of a burner complete with globe was much higher than we had been charging, and our outdoor staff predicted a small sale in consequence.

Enthusiasm, exhibition display (we had no showroom then), and advertising created a demand for the new burners beyond my most hopeful expectations. Many gross were sold. If consumers can be induced to spend a few pounds on gas fittings, it is a hopeful sign of retaining their custom for a few years.

As time went on, and the fashion for silk shades became established, some modification of burners became desirable. We decided to install screw fitting to take a larger clear glass

globe and so reduce the chance of breakage from heat. A heat disperser called " Discus " was also advocated.

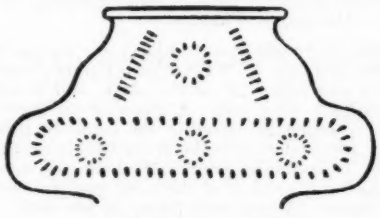
After some years, although electricity has crept into a few of the houses, it is noticeable that a number of the small bracket-burners with the bayonet-fitting Vitreosil globes have been retained in use.

Another Policy Became Overdue.

After five or six years the freshness of our campaign wore off. We were evidently getting stale. The electricity shops displayed a variety of new ornate shades in silk, glass, cartridge paper, &c., to suit the needs of the most fastidious. Our range of goods was meagre in comparison. Indirect lighting with the bowl fitting was extensively advertised by our electrical friends. I am not convinced of the wisdom of recommending generally the ornamental bowl for home lighting, notwithstanding its artistic appearance or its suitability for certain rooms. When bowl lighting is chosen the candle power must be increased to ensure adequate illumination. Allowance has to be made for the dust and dirt film which accumulates in the bowl. This not only means an increased running cost for gas, but the additional concentrated heat emitted from the burner hastens the collection of dirt on the fitting and ceiling.

It is generally agreed that ceiling or centre room lighting gives the best spread of illumination. It is also safe to assume that more rooms are actually used with centre lighting, and it is in this field particularly where progress can be made. Consumers desiring something better than the small size globes (and they are the people who can probably afford to install electricity) might well have their attention drawn to the open-bottom glass shade suspended by chains from the fitting.

This shade has a very pleasing appearance; it gives direct and reflected light, is highly efficient but is obtainable so far only in a limited range of colours.



Open Bottom Glass Shade.

We are now relying upon this shade, fitted on pendants without lever taps but with concealed tubes for the Newbridge switch cable to pass through. This production enables us to give a really neat fitting, ornamental or plain, with the same convenience of lighting as electricity. Our outdoor staff now recommend this line when interviewing old or prospective customers. If consumers prefer silk, parchment, collinoid, or other fancy shades, they can select them from our showroom, but we have confidence in, and emphasize, our recommendation of the above described complete fitting.

I cannot here discuss the various high-class lamps and pendant fittings made by one or two specialist firms, but it must not be assumed that I am adverse to them.

A New Distance Lighter.

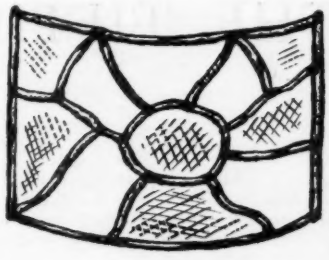
We are all awaiting the advent of the perfected distance lighter which will ignite gas without a by-pass. When this is obtainable the industry will be armed with an excellent " lever " for retaining and developing the lighting load. In the meantime the fact cannot be disguised that for wall brackets and bracket burner fittings the lead cased cable or air tube with pneumatic switches is unsightly. The fitting seems a mass of gadgets, and appearance, in consequence, is sacrificed.

A new distance lighter called the " Noctus " does not possess these disadvantages. The distance control is operated on the level principle by a very fine chain which answers a similar purpose to that of the switch line. The chain is connected to the lever tap on the bracket. This tap is weighted so that when the tension is taken off the chain the tap lever falls down and so turns off the gas. This distance lighter is made also to work on pendants, but as the chain cannot advantageously be laid under ceilings of rooms, its introduction where concealment is desired is limited.

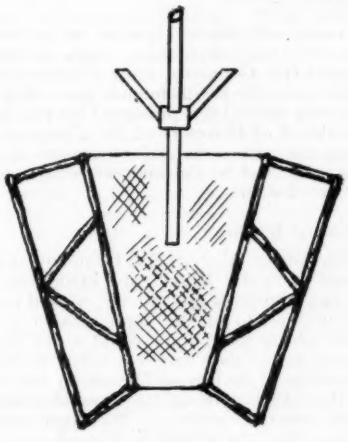
The Artistic Side.

Higher education, evening classes, and the extension generally of science and art classes are influencing the minds of the masses and developing the artistic sense. It is noticeable in many directions—dress, for example, and colour schemes in home furnishing. The lighting has to enter into the colour scheme of the room and unobtrusively form part of it.

All this rightly makes an appeal to the present generation and is a step in the right direction, but the gas industry cannot take part in it by offering or suggesting the use of ugly burners, or steel enamel lamps irrespective of their fancy colours. These are totally void of artistic merit; some are not even symmetrical in form, although they may answer a utilitarian use in warehouses. Immediately the decorative side of gas lighting is requested by a consumer, some attempt should be made to introduce gas lighting in a sphere in which it can do itself some credit. Illumination may be sacrificed for effect to such an extent as ultimately to discredit the light giving medium. This is where reflected and refracted light should be striven for. Skill will often improve, from a lighting viewpoint, the artistic ideas of a customer without detracting from its beauty.

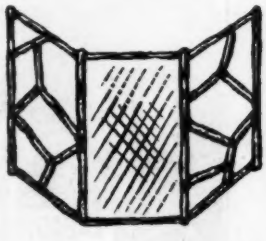


Oak rooms in old houses with their low ceilings are difficult to light with gas; but when owners insist on discarding the ordinary globes which allow a good light, and introduce leaded-light attachments the problem is intensified. The people who go in for these fitments are usually of artistic temperament. They sometimes make the shades themselves at home-craft classes or schools, or have them made at one of the Guilds who specialize in leaded-light work. I have offered suggestions, which have proved advantageous when put to the test in the make-up of these lights.



In wall lights the brackets usually have to be as close as possible to the walls, and we fix bracket burners with two No. 2 mantles, connecting them very low. By introducing pieces of prismatic glass and placing them with due regard to the light direction requirements, quite a useful effect can be attained.

The ceilings, being low, can be covered decoratively above the burner by similarly-made glasswork with a negligible amount of colour. This can be taken down for cleaning, and the effect is quite good.



If hanging shades or bowl-shape lights are made for suspension lamps, the bottoms should always be open. There are many beautiful and helpful designs obtainable from makers of gas fittings, but it is an extraordinary fact that when a job has to be tackled the customer has his own idea of his requirements, which seldom tallies with stock pattern.

I often wonder why a burner marketed a few years ago, which is well constructed and practically concealed within the

globe, and is of universal size, has not become more popular. This burner seems to comply with the requirements of writers, and others attending District Circle Meetings.

AN INCIDENT AND A MORAL.

Some of our district is rural, and one afternoon I passed in this area a well-cultivated allotment garden. An old countryman was working in it, and I expressed surprise and admiration at his heavy crops. I concluded that the ground must be very rich to yield such a harvest. He said, "No, the soil is not particularly rich, but I suppose that I get about as much out of it as I put into it."

As I went away the old countryman's statement kept recurring in my mind.

IN THE 'FIFTIES.

Glimpses into the Files of the "JOURNAL"

Remedy for Whooping Cough.

Great numbers of children labouring under whooping cough now visit the gas-works in Preston, for the purpose of breathing the exhalations from the gas lime. It is said that all the little sufferers feel considerably relieved, and many are absolutely cured by this simple remedy.

A Trifle Mixed.

The following is from an essay on coal by an Oxford Examination candidate: "Coal is a black mineral. The way they produce it is this: First they dig a large pit in the earth. Then they cut down a quantity of timber and put it in the pit, and cover the whole with peat. Then they burn the timber. After it has burnt once it becomes charcoal, and out of the charcoal they make oxygen gas, with which we light our streets and houses."

Twenty Pounds Reward.

Whereas some evil disposed person or persons did, on the night of the 14th inst. (February, 1855), on the premises of the Commercial Gas Company, open a by-pass valve, whereby the gasholders were filled with impure gas: And whereas such an act could only have been prompted by the most malicious motives, the Board of Directors of the Company have resolved upon offering the above reward to anyone giving such information as may lead to the apprehension and conviction of the offender or offenders.

A Novel Dining Room.

The Directors of the Western Gas Company and their friends, to the number of twelve individuals, inaugurated the completion of their new chimneys by a dinner, cooked on the premises, and served on the top of the shaft, where a platform was erected from which the guests could enjoy the magnificent prospect spread out at their feet, extending to the Surrey Hills and the Grand Stand on Epsom Downs on the one side and to Harrow on the other. A round table provided ample accommodation for all, and the conviviality was kept up till the setting sun gave notice that it was time to descend.

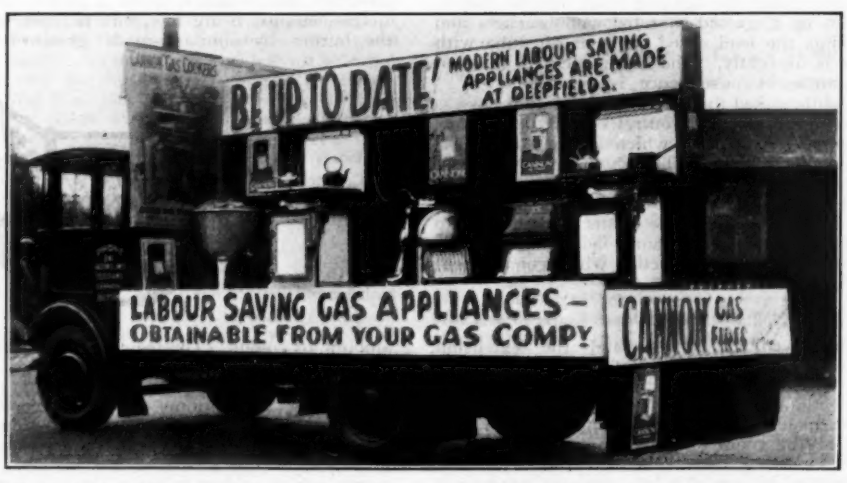
Prince Albert Admires Gasfittings.

That noble institution Wellington College, great in the grandeur of its architectural excellence, erected as a memento of England's glory, was opened for the reception of students on Jan. 20, 1859. The Royal Family have taken a great interest in the building throughout, having repeatedly visited the place during its progress. A few days since, Prince Albert went to the College for the purpose of inspecting the whole of the arrangements. His Royal Highness took much interest in the gas-works and fittings for lighting the College, asking many questions of the engineer; the whole of the work for lighting this College having been executed, to the entire satisfaction of the authorities, by Mr. George Walcott. The Queen formally opened the College on Jan. 29, the Duke of Wellington and others of the nobility being present. Numerous gas devices were exhibited in the evening to celebrate this auspicious event.

Attempt to Destroy a Theatre.

At the Royal Amphitheatre, Liverpool, during the performance of the last act of "Like and Unlike," a very strong smell of gas was perceived on the stage, and in a few minutes all the footlights went out. A gas-man on the premises immediately proceeded to ascertain the cause of this unexpected occurrence, and underneath the stage he discovered John Ball, a carpenter occasionally employed about the theatre, in the act of removing a portion of the 1-in. gas pipe which supplies the stage lights. A saw was found at his feet, evidently the instrument used in sawing the pipe through. The gas was instantly turned off at the meter, or the result would have been dreadful, inasmuch as the pipe in question was only 18 in. below the stage, and threw out a body of gas which would cause a flame 6 ft. high. Had it not been thus timely discovered, the dry stage would have been instantly in flames, or the cellars below would have been charged with gas, rendering an explosion inevitable. What the consequences of such a disaster at the time (as the house was crowded, the performance being for the benefit of Madame Celeste) would have been, it is painful to imagine. Ball was brought up before Mr. Mansfield at the police-court, and committed to the Assizes for trial. He had applied the same evening for employment at the theatre, but as he appeared intoxicated he was refused.

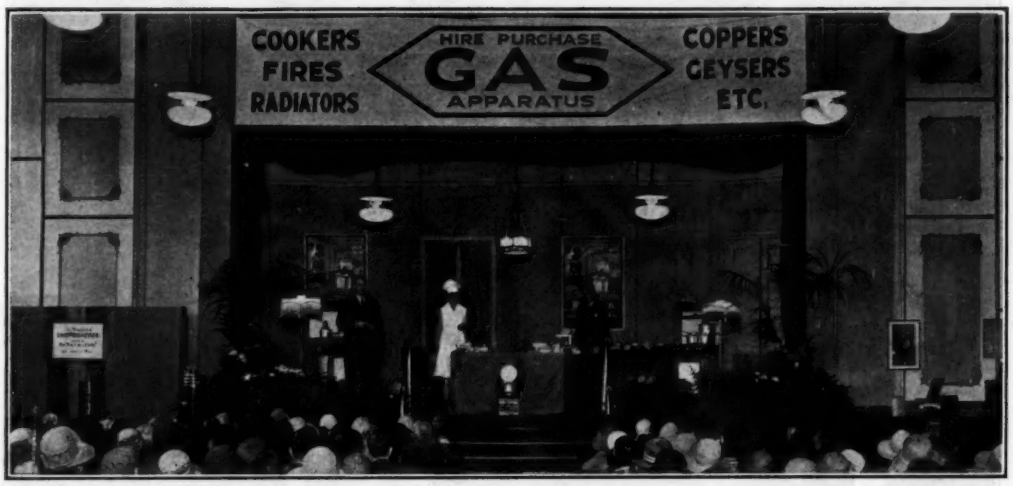
Advertising Gas at Bilston


BE UP TO DATE!
MODERN LABOUR SAVING APPLIANCES ARE MADE AT DEEPFIELDS.
LABOUR SAVING GAS APPLIANCES—
OBTAINABLE FROM YOUR GAS COMPY
CANNON GAS FIRES

OUR PHOTOGRAPH IS OF A LARGE LORRY, FITTED UP BY CANNON IRON FOUNDRIES, LTD., WITH MODERN GAS APPLIANCES, WHICH TOOK PART IN A PROCESSION IN CONNECTION WITH A HOSPITAL CARNIVAL AT BILSTON, STAFFS.

GAS EXHIBITION AT SURBITON - -

The Wandsworth, Wimbledon, and Epsom District Gas Company staged an attractive exhibition of gas appliances at the Surbiton Assembly Rooms, and the opening ceremony was performed by Mr. C. M. Croft, the General Manager of the Company.



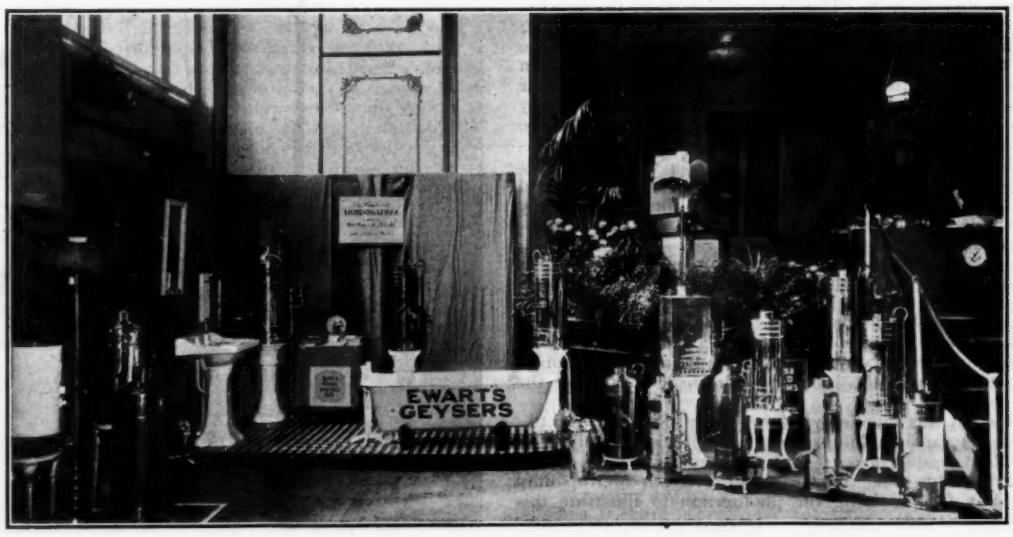
Great things have been done for gas in these last two weeks at Surbiton, Surrey. The Wandsworth, Wimbledon, and Epsom District Gas Company staged one of the most attractive exhibitions seen for many years, at the Surbiton Assembly Rooms, and the opening ceremony was performed by Mr. C. M. Croft, M.I.Mech.E., F.C.S., General Manager of the Company, who said that the Company regarded this as their first opportunity of meeting and talking with the consumers. He wished to point out to them the advantages of gas over electricity. Gas was healthy. This was proved by the fact that the street in London that used the most gas was Harley Street, and the residents there should know what was good for them.

Taking electricity at the price of a penny a unit it was stlll three times as dear as gas for cooking, three and a half times as dear for heating (without giving the same advantages of ventilation), and it was three times as costly for water heating. On the score of usefulness gas could not be excelled. The apparatus that they saw in the hall could be obtained by direct or hire-purchase, and the Company only sold apparatus which they had personally tested and found economical and safe. The Company's officials were at all times prepared to give advice as to how to economize in gas, as they found that the people who saved money by using gas put gas to more use in their houses. Mr. Croft also gave a short explanation of the basic price as it affected the consumer, the stockholder, and the co-partner. Speaking of the increase of business since the transfer of the Kingston Gas Company, Mr. Croft said that it had meant the employment of over a hundred men skilled in gasfitting, and the Company's mains were now over 600 miles in length. To carry the coals required to Kingston, they had built a new 2000-ton collier, which was launched on Sept. 25.

The arrangement of the exhibition was in the capable hands of Mr. Adams, the Company's Publicity Manager, and the result combined utility and beauty. The hall was attractively lighted with gas lamps operated by wall switches, and was very effectively arranged. The centre of the hall was laid out with seating accommodation for audiences at the cookery demonstrations, given by Miss Kirkby, of Radiation Limited, and very large attendances were obtained at both the afternoon and evening sessions. An efficient loud-speaker installation carried the voice of the lecturess pleasantly all over the hall, and great interest was shown in the working of the Radiation " New World " cookers with " Regulo " automatic oven-heat control, which were used throughout. Around the hall were arrayed stands occupied by the following manufacturers:

Arden Hill & Co.
The Davis Gas Stove Company, Ltd.
Fletcher Russell, & Co., Ltd.
Richmonds Gas Stove Company, Ltd.
Wilsons & Mathiesons, Ltd.
John Wright & Co.

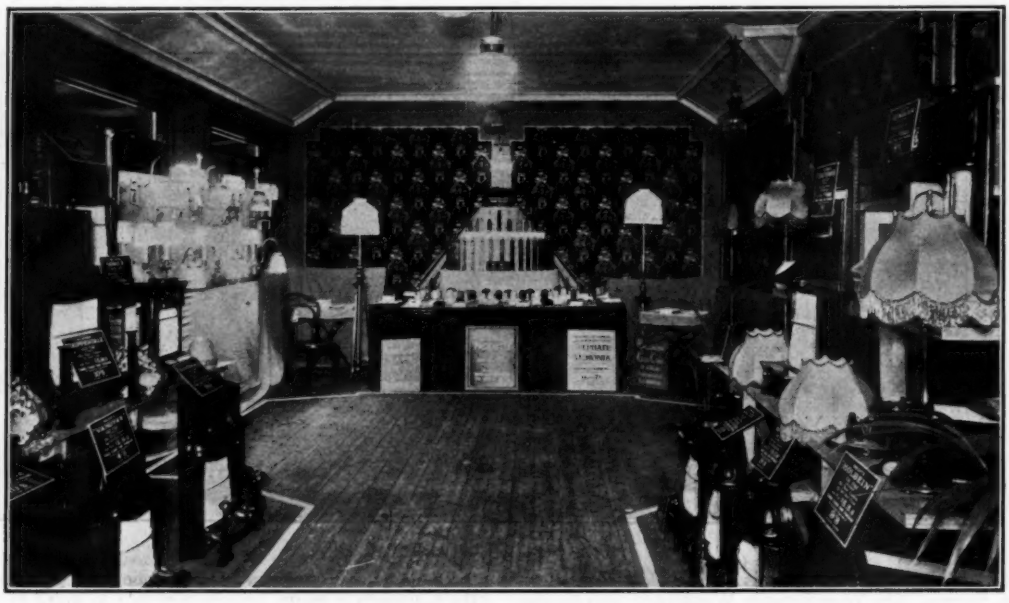
A very effective exhibit was also staged by Ewart & Son, Ltd. Each of the Radiation firms showed attractive examples of



their " New World " cookers; " Beam " radiant gas fires; water heaters (including Richmonds' " Equator " and Wright's " Sunhot ") radiators, gas irons, &c. The effect of these appliances all finished in gleaming porcelain enamel or the various new exteriors now produced by these Companies, was in marked contrast to the drab black displays that constituted gas exhibitions of even a few years ago.

Messrs. Ewarts showed examples of their " Califont," " Brilliant," and " Lightning " geysers.

Very large attendances were the rule every day, and both the Gas Company and the exhibitors should have every cause for satisfaction at such a great send-off to the former's enterprise in opening up this new and extensive area to the advantages of the latest types of gas appliances.



ANOTHER VIEW OF THE SURBITON EXHIBITION.

Public Lighting by Gas

Unusual Installation in a London Borough.

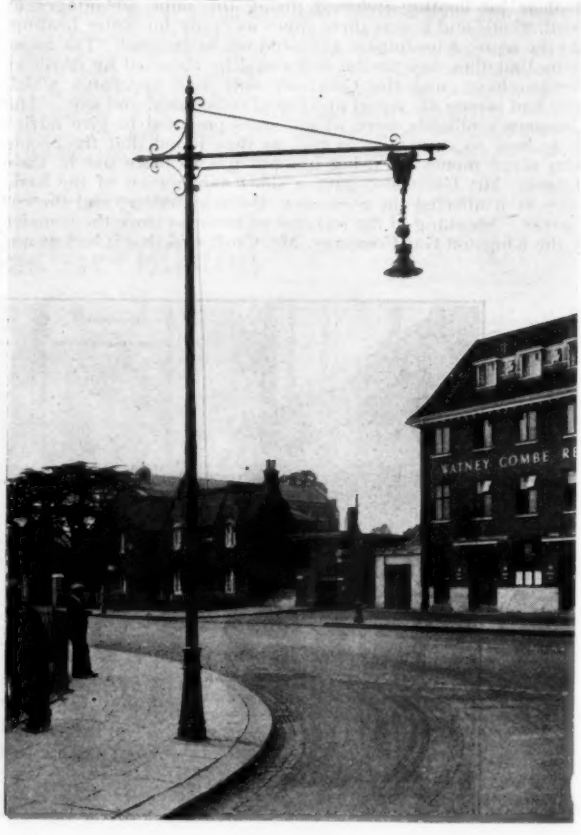
The accompanying illustration is of a novel installation of lamp posts with traversing and lowering gear. The particular problem to be dealt with by a London Borough was to light effectively a number of important points, keeping the light well out into the road; and for this purpose it was desired to design a post and bracket to bring the lantern at a clear height of 18 to 20 ft., 9 ft. or so from the kerb. In view of the traffic difficulty, it was decided that effective lowering arrangements should be incorporated, to facilitate cleaning and maintenance; also, the lamp was not only to be lowered but to be brought to the side close to the foot-walk.

The resulting design is shown in the illustration. The pillar comprises a weldless steel post in three sections shrunk together and having weathered joints, the long extension bracket clamped on about 2 ft. from the top, the projecting portion being approximately 9 ft. The horizontal arm of the bracket is of stiff steel tubing secured to a malleable clamp gripping the post and with an inclined stay and clamp above the bracket. Ornaments as shown are also provided. In addition there is a clip-on fluted cast-iron base. A stiff steel circular bar in the form of a tension member is strained immediately under the bracket tube, and this serves as a run-way for the travelling trolley which carries the lantern. A double pulley is fitted near the post end of this member, and the operating ropes pass over same from the trolley to the winch, which is clipped on to the pillar in a convenient position near the ground. The winch has a double barrel; each barrel can be controlled separately, or both may be controlled together.

The traverse lowering gear is of the London Electric Firm's latest pattern, and enables the lamp to be lowered at any point along the run-way; and, as indicated above, this will normally be by the kerb. The lamps are controlled by a 14-day clock which is interposed between the suspension gear and the lamp. The piping has been very neatly carried out, running through the column and under the bracket to the fixed portion of the lowering gear.

The equipment was supplied by Messrs. Wm. Sugg & Co., Ltd., of Westminster, and the lamps are their " Rochester (Metro) " 6-light pattern.

We acknowledge the courtesy of the South Metropolitan Gas Company for providing the photograph to illustrate this article.



SMART GASHOLDER REPAIR WORK - -

Mr. R. G. Shadbolt, Past-President of the Institution of Gas Engineers, describes a rapid gasholder repair at the Boston Gas-Works, carried out by Messrs. Broadhead Constructions, Ltd.

The gas storage capacity at the Boston (Lincs.) Gas-Works consists of two holders—viz. :

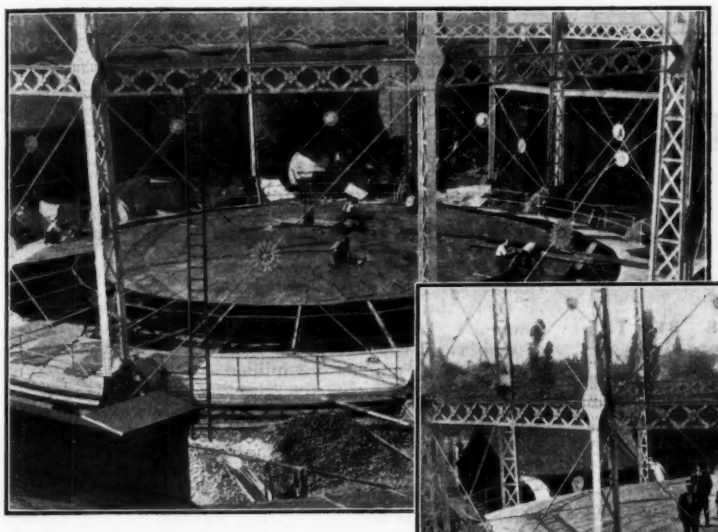
No. 1 holder (3 lifts)	365,000 c.ft.
No. 2 ,, (3 ,,)	155,000 ,,

The top lift of No. 1 Holder is a flying lift 80 ft. in diameter, extending beyond the guide framing when the holder is inflated in the third or outer lift. The crown of this holder is untrussed, the original trussing being left stationary in the tank. Originally, the holder was erected in 1859 as a single-lift, prepared for telescoping into two lifts. The second lift and additional guide framing were added in 1896, a third lift, with no addition to the guide framing, being added in 1913. No. 2 Holder, originally a single-lift one, was renewed and extended to a three-lift holder in 1911; owing, however, to defects since developed in the dip of the third or lower lift, only two lifts have, in recent years, been available, thereby reducing the working storage in this holder to 100,000 c.ft.

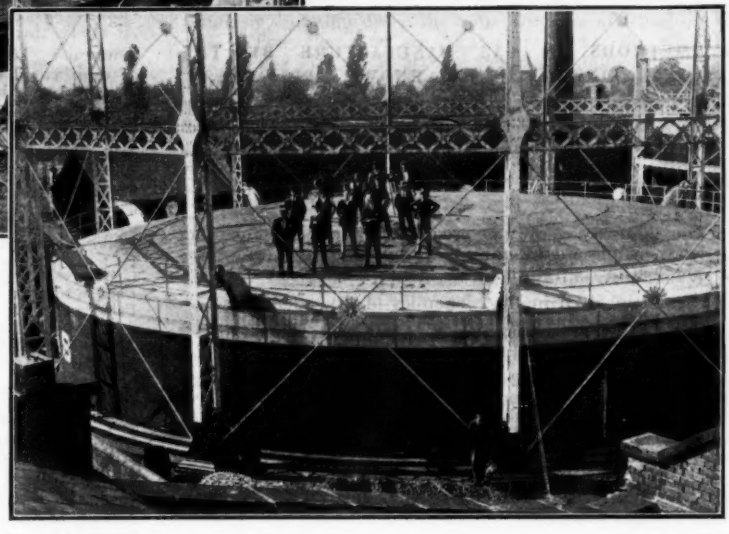
Normally, No. 1 Holder is constantly in commission, No. 2 Holder being used as compensatory storage, taking any excess gas from No. 1 and providing a small auxiliary supply to that of No. 1 should the pressure from the latter fall below that given by No. 2

A booster on the general outlet mains of the two holders acts as a standby in case the holder pressure should fall below that necessary to keep the district governors in action, but normally it is not called upon for this purpose. The crown sheets of the top lift of No. 1 Holder, with the exception of the two outer rings, have latterly shown signs of weakness, and have been patched in sundry places from time to time; but at 11.30 a.m. on Sunday, Aug. 3 last, without any warning, a rent in the crown sheets suddenly developed to the extent of 15 ft. in length. The Company's Management and Staff immediately tackled the job of temporarily stopping the leakage and then patching the rent; and gas production, which had been temporarily diverted to No. 2 Holder, was again passed into No. 1 Holder at 6.30 p.m. In the meantime, some 250,000 c.ft. of gas had escaped through the rent. Naturally, the district pressures fell rapidly under such conditions; nevertheless, the normal district pressures were restored, by the use of No. 2 Holder and the booster, within 40 minutes of the accident occurring. Further, existing patches on the crown of No. 1 were disturbed and distorted by the unusual strains set up, and on several occasions on following days smaller rents in various parts of the crown occurred, each of from about 4 ft. and under in length. These were quickly dealt with, constant supervision by both night and day being given to this work.

These rents were generally along the seams of the sheeting, which, when subsequently stripped, showed grooving by wastage or corrosion along the body of the overlapping plates, such grooving running parallel and close to the edges of the underlying plates.



The photograph on the left was taken after three days' work from the commencement of stripping old sheets.



The view on the right was taken on the day after completion of the work.

The outlook for the coming winter season was certainly most alarming; and as I happen to be a member of the Board of Directors, it was my bounden duty to visit the scene of the accident at the earliest possible moment, and discuss the situation with the Company's Engineer. After much consideration and discussion, we called into conference a well-known Constructional Engineer, and finally called a special meeting of the Board of Directors, which was held on Monday morning, Aug. 11, to whom the situation was fully explained. The recommendation to throw the holder out of commission for the time necessary to strip all the defective crown sheeting and re-sheet with new material was adopted and acted upon. The work was entrusted to Messrs. Broadhead Constructions, Ltd., to whom the order to proceed was given, by telephone, on the same day. From this stage, the time-table of the work was as follows :

Aug. 11.—Order placed by telephone.
,, 12.—Order confirmed and particulars of requirements given.
,, 13.—Instructions and details given to rolling mills.
Night of Aug. 13 / Morning of Aug. 14 } Plates rolled at mills.
Aug. 16.—New plates delivered at contractors' works for cropping and finishing.

Aug. 22.—Plates and all material dispatched to Boston.
,, 26 (2.0 a.m.).—Plates and material arrived at Boston.
,, 26 (7.0 a.m.).— ,, ,, ,, delivered into gas-works siding.
,, 26 (6.0 a.m.).—Holder grounded.
,, 26 (10.30 a.m.).—Stripping of old crown sheets commenced.

Sept. 2 (6.0 p.m.).—Re-sheeting completed.
,, 2 (10.0 p.m.).—Gas passed into holder.

Thus the holder was actually out of commission for 1 week 16 hours. The accompanying photographs show the progress of the work, the one on the left being taken after three days' work from commencement of stripping old sheets, and the one on the right on the morning of Sept. 3, the day after completion of the work.

Too much credit cannot be given to Mr. W. C. Chapman, the Company's Engineer, and his Staff, first for the skilful manner in which they overcame almost superhuman difficulties in dealing with the situation so suddenly thrust upon them—and that without injury or damage to men or other plant—also the rapidity with which the failing supply of gas was restored. And, secondly, to the able and efficient manner in which the supply to the district was fully maintained at normal pressures throughout the whole of the time No. 1 Holder was out of commission—and this with a working storage of but 100,000 c.ft., with a maximum day's output during that time of 478,000 c.ft., and a maximum hour's output of 52,000 c.ft. This, of course, was achieved by putting the load variations mainly upon the carbonizing plant, there being no water gas or auxiliary plant of any kind; but, as the works connections generally are far too small for the normal maximum winter's production of 670,000 c.ft. per diem, and are, indeed, in process of enlargement in parts, the margin of variation in gas production was restricted to fairly narrow limits. Nevertheless, by most strenuous efforts on the part of all concerned, this margin was made to suffice.

I feel also, and you will agree, that it is but giving honour where honour is due to acknowledge frankly the efficient and expeditious services rendered by Broadhead Constructions, Ltd., who spared nothing in time, energy, and application to further the work and reduce to an absolute minimum the time during which the holder should be "laid off;" and the Company wish to acknowledge the splendid effort made by them.

With your permission, I venture to put forward this record as both a warning of the potentialities in many such gasholder crowns, and as an example of what is possible in the way of temporary expedients when a works is deprived of a considerable portion of its storage.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany.

NEW METHODS IN GAS MANUFACTURE BY THE RATIONAL LINKING UP OF KNOWN APPLIANCES.

Herr Schumacher, in "Das Gas- und Wasserfach," 1930, **73**, 861-866 (Sept. 13), states that long distance transmission of gas from the mines is not the only panacea for the German gas industry since rationalization can be equally effective. He discusses:

(1) The adjustment of gas production to widely varying loads, while maintaining a throughput as uniform as possible in the retorts.

(2) Factors involved in the economics of dry quenching.

(3) Increase of the economies of waste-heat boilers in the case of water gas plants.

(4) Improvements in operation by the combination of retort firing with steam production.

  (*a*) With direct-fired boilers working on water gas or boilers with a universal travelling grate and supplementary gas firing.

  (*b*) With waste-heat boilers and supplementary water gas firing.

(5) The layout of gas-works on the basis of the new methods proposed.

Carbonizing plant has hitherto been planned with a view to the provision of capacity adequate for the maximum daily make *plus* a margin of 10-25 p.ct. The maximum make may be estimated at $\frac{1}{250}$, $\frac{1}{285}$, or $\frac{1}{310}$ of the yearly make, depending on the degree of variation of the daily load. The fact has hitherto not been taken into account that electricity is to a large and increasing extent supplanting gas for lighting purposes everywhere save for street lighting. Moreover, due to this and to other causes, there are many instances in which the summer make may exceed the winter make. On the other hand, especially where this is encouraged by suitable tariffs, the increase in the heating load may more than compensate for the reduction in the lighting load. The old methods of estimating the necessary size of carbonizing plant on the basis of the annual make are, therefore, no longer applicable.

Compound settings, adapted to the alternatives of firing with coal gas or producer gas are well known, as are also water gas plants, complete gasification plant, and processes for the production of carburetted water gas from coke and lignite tar.

The author shows how flexibility may be obtained by having a relatively small carbonizing plant and supplementing the make of straight gas with double gas. The retorts are switched over to coal gas firing during the seasons of low demands. This enables the retorts to run at nearly 60 p.ct. of their rated capacity in the case considered [winter 5·3 million c.ft./day, summer 1·8 million c.ft./day, year 1200 million c.ft.; C.V., 470] during the season of low demand and, though not ideal, is better than letting down some of the retorts. The scheme is as follows:

—	Winter.	Summer.
Coal to retorts, per day	225 tons	130 tons
P.Ct. of full capacity	100 p.ct.	58 p.ct.
C.Ft. of 560 gas per ton of coal	11,700	11,700
Used in settings	*Nil*	4,900
Balance	11,700	6,800
Add double gas (380 C.V.) c.ft.	11,700	6,800
Total c.ft. at 470 C.V.	23,400	13,600
Equivalent c.ft. per day	5·3 millions	1·8 millions

Between seasons, the net gas produced from the retorts is varied by firing with producer gas or coal gas as necessary.

A second case is also considered, for the same daily volumes. Here, straight gas and blue water gas are mixed, and, as before, the settings are coal gas fired in the summer. With a setting of the same size as before, the retorts will in summer be working at a higher percentage capacity (80 p.ct.) than in the previous example, since the gas mixture will be richer in coal gas, as blue water gas has a lower calorific value than has double gas. For the same reason, the winter load must in this case be met by addition of carburetted water gas to the mixture of coal gas and blue water gas.

The monthly variations in the output of the retorts and generators, the quantities of coal carbonized and gasified, the coke for sale and for the producers, and, where applicable, in the composition of the gas are shown graphically.

The two schemes differ in that one is based on a mixture of coal gas with double gas, and the other on a mixture of coal gas and blue and/or carburetted water gas. Whether the former scheme can be adopted depends on the availability at a suitable price of coals adapted for the double gas process.

It can rightly be urged that carburetted water gas is dearer than straight gas. This is, however, compensated by the fact that the capital costs are lower than they would be if the wide seasonal fluctuations had to be borne by the much larger carbonizing plant required if a mixed gas were not supplied.

If it be desired to enter the coke market, there remains to decide the question whether the smallest possible carbonizing plant should be installed or whether a larger plant should be selected even though it would work at a lower average percentage of the full capacity. Blending and mixing of coals such as is possible in a carbonizing plant not only enables a high grade coke to be made, but also enables a higher gas

yield to be realized. This must be taken into account in deciding the question.

As regards dry quenching, most systems are very expensive. Two new methods are, however, available, and in them the reduction of temperature is effected in two or more stages. In the first, the temperature drop from 1000°-900° C. to 700°-600° C. is employed for the manufacture of water gas and the subsequent drop for the true quenching. Water gas manufacture during coke cooling is not completely new. In a double-stage process such as this, there must be special precautions, or else explosions may occur. The second method involves production of high-pressure steam during the cooling from 1000°-900° C. to 700° C., a stage of feed-water heating or generation of low-pressure steam during the cooling from 700° C. to 400° C. and wet quenching from 400° C. downwards. The whole plant is self-contained. The heat transfer in the first two stages is effected by the circulation of waste gases which heat the boilers. The system enables the boilers and heaters to be smaller than in former plants owing to the higher temperatures involved, since dry cooling is not carried beyond 400° C. It is therefore cheaper.

As regards waste-heat boilers, these are expensive owing to their small production of steam compared with direct-fired boilers. In a waste-heat boiler coupled to a water gas plant, passage of blow gas occurs only during 12 minutes in each hour. By suitable construction of the boilers, unpurified producer gas firing or coal gas firing may be employed for the remainder of the hour. As an example, a boiler of heating surface equal to 1300 sq. ft. coupled to a water gas plant of 35,000 c.ft. hourly capacity would produce 1 ton of steam per hour if heated only by the blow gases—*i.e.*, the steam production would be 1·7 lbs. of steam per sq. ft. per hour. If supplementary gas firing were adopted and the rate of steam production during the period of gas firing were kept at the same level, the hourly production of steam could be 4 tons or 6·8 lbs. of steam per sq. ft. per hour, allowing for time lost in the reversals. The capital cost of the boiler will be but slightly increased by the extra equipment required, but the cost of steam to the gas-works will be very materially lowered.

The scheme outlined above for the compound firing of settings apparently involves the laying up of the central producers during the summer, and this would not be economical. This is, however, not the case, since they can be used for supplying gas for the heating of the boilers and of the waste-heat boilers of the water gas generators. Unpurified hot gas may be used for this purpose, whereas clean cool gas is required for the retorts. The producers should therefore be situated as close as possible to the boilers. Diagrams of combined producers and boilers are shown. The producers, also, may be surrounded by a jacket for the production of high-pressure steam, and the boilers may, in addition, be provided with travelling grates for coke firing. This arrangement enables even small works to have central producers.

A further development in connection with the waste-heat boilers of settings is supplementary heating by producer gas.

These additional uses for producer gas obviate the need for a holder for the producer gas which is normally needed when, for example, the supply of gas to the settings is interrupted during a change of the retorts. The producers are in constant use, and all that is required is a modern type of automatic regulator for the air supply.

Finally, typical layouts for gas-works are shown, embodying the most convenient disposition of the plant on the basis of the author's proposals.

STOPPAGES IN ASCENSION PIPES.

Stoppages in ascension pipes are a function of the temperature in the pipes (" Le Gaz et l'Electricité," 1930, **66**, 86 (August)). The tar which collects in the pipes may run down and fall back on the sole of the retort mouthpiece if the temperature is too low. If the temperature is too high, distillation of the tar occurs with formation of a soft or even a hard pitch.

In general, the chief cause is in the construction of the front brickwork, which is often too narrow. A thickness of 14 in. is the minimum, and it is advisable to have a thickness of 18 in. when stoppages are to be avoided. Even where a normal thickness of 14 in. is employed, it is necessary to take care that the front of the retort is not too hot—*e.g.*, by plugging the front burners in the case of settings fired by producer gas.

Various palliatives may be adopted in small works, and these differ in their efficacy and ease of application. A simple method of doubtful efficacy is to place, at every charge, a deflector in the mouthpiece of the retort. This should have the effect of retarding the gas and slightly cooling it, and of condensing a little of the tar, the dust being thereby retained. Carbonizers are aware of the expedient of placing damp coal in the mouthpiece of the retort, for the purpose of retarding the heating-up of the ascension pipe. For a similar purpose, water may be allowed to fall dropwise down the pipe, but the flow is liable to speedy interruption owing to the large amount of dust present. Furthermore, the tap is always difficult to adjust to the small quantity of water required.

An excellent method, though rather a troublesome one, is to surround the pipes with a water-jacket. It is easily possible to adjust the flow to the amount required to maintain a temperature such that blockages do not occur. Generally, only the ascension pipe of the central retort should require this treatment, since the other expedients have been found to answer well for those of the outer retorts.

In the case of any installation, a few minutes' reflection should indicate which method ought to be adopted. Thick front brickwork is, however, always the surest safeguard. It is, nevertheless, necessary to avoid heating the retorts to a white heat, and the temperature should not be allowed to exceed that of a bright red. With excessively hot retorts, it is dangerous to skip charges, since the tarry deposits will be subjected to distillation during the idle periods.

There is but one suitable tool for the clearing of stopped pipes —namely, a light borer, a steel rod of diameter $\frac{5}{8}$ in. with one end bent and set to an edge to act as a chisel. The slight bend is very important, since it enables the tool to dislodge the deposits from the pipe, whereas a straight rod would merely make a small hole in the centre of the obstruction.

The author, M. Gabriel, will welcome further suggestions.

THE CLEANING OF PRODUCER GAS.

M. Vany, in " Le Gaz et l'Electricité," 1930, **66**, 84 (August), gives a description of the Modave process for the cleaning of producer gas. The process is also adapted to the removal of dust from gases in general.

The essential feature is a series of vertical hollow elements having a cross-sectional shape appropriate to the particular requirements of each individual case. The upper part of the apparatus contains a constant level reservoir supplied with water by an automatic device. The water is supplied to each element by way of calibrated orifices in the base of the reservoir, these being continued as tubes extending into the interior of the elements. The water fills the elements and overflows continuously, running down the outer surfaces and keeping them wet. The elements are spaced in rows, the rows being staggered. The whole arrangement is contained in a metallic casing. The direction of the gas is cross-ways to the elements and the gas is constrained to take a tortuous passage between them. The shape of the elements is such that formation of eddies is minimized. The descending stream of water frees the gas from suspended matter, both fine and coarse, and the efficiency is independent of the nature of the dust. The water charged with dust collects in a sump at the bottom of the apparatus and is allowed to flow out by way of a sluice and weir. The plant is a static one and requires but little power or attention. The water consumption is approximately 3 gallons per 1000 c.ft. of gas and the pressure drop is approximately 8/10 in. W.G. The gas is cooled by 50°-60° C. during passage through the apparatus.

Traces of heavy tar present as vapour and tar fog are not removed, but the subsequent deposition of this tar in the conduits leading to the burners of furnaces is prevented by re-warming the gas through 10°-15° C. by passing it through a sheet-iron vessel in which is contained a series of steam-heated pipes provided with small wings. These pipes are so arranged that they provide as large a surface as possible without creating more than a slight pressure drop.

PRIZES FOR TAR EMULSIONS.

An advertisement announcing that prizes of 5000, 3000, and 2000 Marks for the best tar emulsions will be given by the Auskunft und Beratungsstelle für Teerstrassenbau, e.V., Essen, on behalf of the Deutsche Teerindustrie appears in " Brennstoff-Chemie " of Aug. 15 (page 3 of cover). The idea is to secure a satisfactory emulsion with the object of preventing the flooding of the market with inferior products. Particulars as to the conditions which the emulsions must fulfil are obtainable from the Secretary, Dr. Geisselbrecht, Essen II, Hagen 45, to whom all samples are to be submitted. The winner will have the right to develop the use of his emulsion which will be adopted as standard material. The last date for the submission of entries is Dec. 31, 1930. It is possible for two or even all three of the prizes to be won by one candidate. For the purposes of the investigations which will be carried out, 5 samples, each of 10 kilogrammes, must be submitted. Candidates must state that they are in a position to furnish sufficient material to enable road-tests to be made. Alternatively, facilities will be offered to candidates to supervise the preparation of the necessary batches under guaranteed conditions as to secrecy. The expenses incurred in connection with the supply of the material for these tests will be defrayed. Candidates may make mention of any special features or advantages shown by their emulsions. The awards will be made on July 1, 1931.

THE "JOURNAL" TECHNICAL RECORD

Which also contains Full Reports of Meetings of Gas and Allied Associations ———

Carburetted Water Gas and the Influence of Temperature on the Composition of the Tar Formed

By T. B. GLOVER, of the Primitiva Gas Company of Buenos Aires.

[Submitted in Support of an Application for the M.Sc. Degree of Gas Engineering in the University of Leeds—June, 1930.]

(*Concluded from p. 704.*)

Distillation and Group Analysis of Tar.

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Sp. Gr.	Olefines. P.Ct.	Aromatics. P.Ct.	Naphthenes and Paraffins. P.Ct.
0–200	5·0	5·0	0·928	34	34	32
200–240	14·5	19·5	0·980	48	32	20
240–260	15·0	34·5	1·000	52	35	13
260–278	9·0	43·5	1·015	68	20	12
278–300	7·5	51·0	1·020	86	12	2

The fraction from 0°-300° C. thus consists of 57 p.ct. olefines, 28 p.ct. aromatics, and 15 p.ct. naphthenes and paraffins.

It is seen that progress towards complete cracking has been made; the paraffins in the higher boiling range have now almost disappeared, and their total percentage is less than half that of Test 1.

Test B. III.

Temperature at base of superheater . . . . . 770° C.
,, below oil injectors . . . . . 755° C.
,, at top of superheater . . . . . 760° C.
Gas-oil used per run . . . . . 21·5 galls.
,, ,, ,, minute . . . . . 6·14 ,,
C.W G. made per run . . . . . 8400 c.ft.
Gas-oil used per 1000 c.ft. . . . . 2·56 galls.
Analysis of C.W.G.—

CO_2	4·8	
C_nH_m	7·6	
O_2	0·5	
CO	30·0	Calorific value—517 B.Th.U.
H_2	37·2	
CH_4	12·9	
N_2	7·0	

Sp. gr. of tar . . . . . 1·095
Total polycyclic compounds, calculated as naphthalene 18·9 p.ct.

Distillation and Group Analysis of Tar.

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Sp. Gr.	Olefines. P.Ct.	Aromatics. P.Ct.	Naphthenes and Paraffins. P.Ct.	Observations.
0–200	6·5	6·5	0·930	38	54	8	..
200–240	15·0	21·5	0·992	66	32	2	Slight solid
240–260	14·5	36·0	1·010	64	34	2	,,
260–278	7·0	43·0	1·025	72	28	0	Ppt.
278–300	6·0	49·0	1·031	86	14	0	..

The fraction from 0°-300° C. consists of 65 p.ct. olefines, 32·7 p.ct. aromatics, 2·3 p.ct. naphthenes and paraffins.

At the temperature of Test B. III., which is incidentally about that usually employed for gas-making, the paraffins of the oil

Test B. IV.

Temperature at base of superheater. . . . . 800° C.
,, below oil injectors . . . . . 780° C.
,, at top of superheater . . . . . 780° C.
Gas-oil used per run . . . . . 19·6 galls.
,, ,, ,, minute . . . . . 5·6 ,,
C.W.G. made per run . . . . . 8470 c.ft.
Gas-oil used per 1000 c.ft. . . . . 2·32 galls.
Analysis of C.W.G.—

CO_2	5·0	
C_nH_m	7·2	
O_2	0·4	
CO	29·6	Calorific value, 510 B.Th.U.
H_2	37·3	
CH_4	13·4	
N_2	7·1	

Sp. gr. of tar . . . . . 1·090
Total polycyclic compounds, calculated as naphthalene 21 p.ct.

Distillation and Group Analysis of Tar.

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Sp. Gr.	Olefines. P.Ct.	Aromatics. P.Ct.	Naphthenes and Paraffins. P.Ct.	Observations.
0–200	3	3	0·905	36	60	4	..
200–240	7·7	10·7	1·000	48	48	4	Heavy ppt.
240–260	11·5	22·2	1·016	64	34	2	30 p.ct. solid
260–278	10·5	32·7	1·030	76	24	0	..
278–300	12·0	44·7	1·042	91	9	0	..

have virtually all been changed. The polycyclic compounds have increased still further, and now begin to show slight precipitation on cooling the naphthalene fraction of the distillation products.

In test B. IV. the 0°-300° C. fraction contains 69·5 p.ct. olefines, 29·1 p.ct. aromatics, and 1·4 p.ct. naphthenes and paraffins.

The solid portions of the fractions 200°-240° and 240°-260° were filtered off and dried as free from oil as possible. They were then re-distilled, and the fractions picrated in order to attempt to identify some of the polycyclic hydrocarbons present.

Re-distillation and Picration of Fraction 200 240° *C.* (800° *C. Tar*).

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Colour of Picrate.	Observations.
100–200	1½	1½	Yellow	50 p.ct. liquid
200–205	1½	3		50 ,, naphthalene
205–207	3	6		20 ,, liquid
207–210	4	10	,,	80 ,, naphthalene
210–212	7	17		
212–214	8	25		
214–216	13	38	,,	Pure naphthalene (B.P. 216°)
216–218	8	46		
218–220	14	60		
220–222	10	70		Naphthalene.
222–225	6	76	Orange yellow	Mixed with B.
225–228	5	81		Methylnaphthalene (B.P. 242°)
228–230	3	84		
230–232	2	86		
232–235	3	89	Deep orange	B. Methylnaphthalene
235–238	1	90		
238–240	3	93		

Re-distillation and Picration of Fraction 240-260° *C.* (800° *C. Tar*).

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Colour of Picrate.	Observations.
210–216	1·0	1·0	Yellow	Naphthalene
216–219	8·2	9·2		
219–221	6·6	15·8	,,	,,
221–223	6·2	22·0	,,	,,
223–225	8·3	30·3	M.Pt. 148–150°	
225–226	3·3	33·6		Picrate sinks to bottom.
226–228	6·2	39·8	Granular orange	B. Methylnaphthalene
228–230	8·2	48·0		
230–231	2·0	50·0		
231–233	4·1	54·1	Yellow on top	
233–235	5·7	59·8	Orange below	..
235–237	6·9	66·7		
237–238	8·2	74·9		
238–240	1·3	76·2	Orange	
240–245	3·3	79·5	M.Pt. 118–120°	B. Methylnaphthalene
245–250	4·5	84·0	Deep red	Diphenyl. (B.P. 254°)
250–255	5·8	89·8		
255–260	6·9	96·7	Red, of greasy appearance	..

Test B V.

Temperature at base of superheater	820° C.
,, below oil injectors	800° C.
,, at top of superheater	805° C.
Gas-oil used per run	19 galls.
,, ,, ,, minute	5·44 ,,
C.W.G. made per run	8440 c.ft.
Gas-oil used per 1000 c.ft.	2·25 galls.
Analysis of C.W.G.—	
CO_2	5·2
C_nH_m	7·4
O_2	0·4
CO	29·6
H_2	37·0
CH_4	13·7
N_2	6·7
Calorific value—526 B.Th.U.	
Sp. gr. of tar	1·120
Total polycyclic compounds, calculated as naphthalene	23 p.ct.

Distillation and Group Analysis of Tar.

Fraction °C.	P.Ct.	Cumulative. P.Ct.	Sp. Gr.	Olefines. P.Ct.	Aromatics. P.Ct.	Naphthenes and Paraffins. P.Ct.	Observations.
0–200	5·2	5·2	0·932	22	78	0	50 p.ct. solid
200–240	14·5	19·7	1·010	16	84	0	Solid
240–260	12·0	31·7	1·022	21	79	0	,,
260–278	6·5	38·2	1·030	60	40	0	20 p.ct. solid
278–300	5·0	43·2	1·038	96	4	0	Liquid

The total fraction 0° to 300° C. shows a very marked change in composition, the olefines now only being 34 p.ct. of the whole, whereas the aromatic compounds have increased to 66 p.ct. The paraffins have been completely eliminated. Lamp black was present in the gas and tar, and there was every evidence of over-cracking.

The fraction 200° to 240° was re-distilled and fractions picrated, as shown in the following table:

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Colour of Picrate.	Observations.
To 207	11·0	11·0		
207–210	8·7	19·7		
210–217	8·1	27·8	Yellow	Naphthalene
217–220	5·4	33·2		
220–222	25·3	58·5		
222–225	8·0	66·5	Yellow & orange	Naphthalene and B. Methylnaphthalene
225–230	13·0	79·5		
230–235	6·5	86·0	Orange	,,
235–245	8·5	94·5		

Comparison of Results.

The most noteworthy changes in the characteristics of the tar formed at the different temperatures of the test are set out in graphical form in graph No. 1. It will be seen that the specific gravity rises fairly uniformly with the temperature of formation, the figure for the 800° tar being slightly off the line. Considering the group analysis of the 0° to 300° C. fractions, we find that the paraffins, which amount to 42 p.ct. in the 720° tar, have fallen to a negligible quantity at 770°, showing that at this temperature all the oil has been effectively cracked. The olefines reach a maximum in the 770° and 800° samples, and are rapidly converted into aromatic compounds above this temperature. The polycyclic hydrocarbons increase steadily with the temperature; these appear, of course, in the group analysis as aromatics.

It must be noted that the oil used per 1000 c.ft. was somewhat lower in Tests B. IV. and B. V. than in the three tests at lower temperatures, thus accentuating slightly the effect of the increased temperature.

Reference to the group analysis of the various boiling point fractions shows that, while the lighter paraffins are more stable than the higher fractions, the olefines of high boiling points are far more stable than the lower members of the series. Thus, even in the 820° tar, in the fraction from 278°-300° there are 96 p.ct. of olefines, while the 200°-240° portion has been largely cracked to aromatics, only 22 p.ct. of olefines having survived.

The mechanism of cracking thus appears to be:

(*a*) The breaking down of heavy paraffins into lighter paraffins, the same process as is used so extensively for increasing the petrol yield in oil refining, but here operating under minimum conditions.

(*b*) The formation of light olefines.

(*c*) The formation of middle boiling point aromatics and high-boiling olefines.

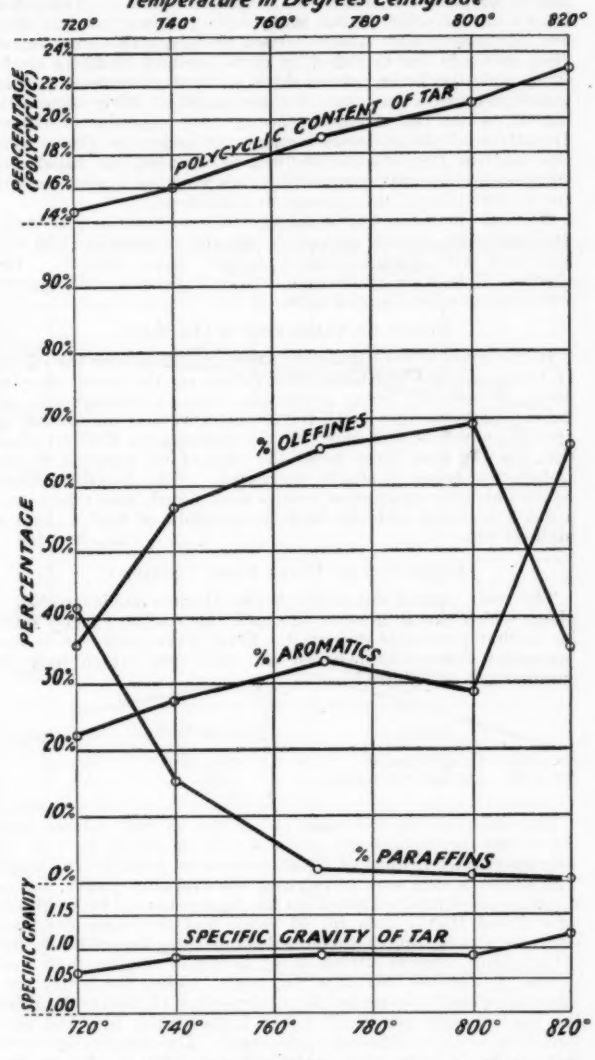
(*d*) The gradually increasing condensation of aromatic compounds to form double and treble ring compounds which are very stable at temperatures far in excess of any reached in a C.W.G. plant.

Gas Enrichment Results.

While only the customary technical analyses of the gas were carried out, no attempts being made to determine the composition of the hydrocarbons present, it is possible to calculate the volume of oil gas made per gallon of oil, the calorific value of

GRAPH Nº 1.

INFLUENCE OF CRACKING TEMPERATURE ON COMPOSITION OF TAR



the oil gas, and the thermal yield per gallon. In Table IV. these results are set out, as calculated by what is known as the "Pacific Coast Method with Providence Modification." This system of calculation was explained at the Convention of the American Gas Association, and is also outlined by A. G. Grant.* Some criticism has been passed on this method, on the grounds that it takes no account of hydrogen evolved from the coke; but it undoubtedly gives comparative results which are of the greatest service in checking up on the working of a C.W.G. set.

The second column of each gas analysis is calculated on a gas free from air and blow gases.

Table IV.

Test No.	B. I.		B. II.		B. III.		B. IV.		B. V.	
Galls. oils per min.	6·14		6·14		6·14		5·60		5·44	
,, ,, per 1000 c.ft.	2·53		2·57		2·56		2·32		2·25	
Cracking temperature	720°		740°		770°		800°		820°	
Gas analysis—										
CO_2	4·5	3·7	4·6	4·1	4·8	4·3	5·0	4·5	5·2	4·8
C_nH_m	7·7	8·5	7·8	8·4	7·6	8·3	7·2	7·8	7·4	8·0
C_2	0·4	..	0·4	..	0·5	..	0·4	..	0·4	..
CO	33·1	36·6	30·1	32·6	30·0	32·8	29·6	32·4	29·6	32·2
H_2	33·9	37·5	38·0	41·1	37·2	40·5	37·3	40·7	37·0	40·3
CH_4	12·4	13·7	12·7	13·8	12·9	14·1	13·4	14·6	13·7	14·9
N_2	8·0	..	6·4	..	7·0	..	7·1	..	6·7	..
Calorific value of C.W.G.	519		522		517		510		526	
Calculated calori. of C_nH_m	2380		2295		2300		2280		2404	
B.Th.U. per c.ft. oil-gas	1970		1428		1475		1440		1600	
C.ft. oil-gas per gallon of oil	55·8		81		77		86		82·7	
Therms enrichment per gallon	1·10		1·15		1·14		1·24		1·32	

* "Gas Journal," Nov. 27, 1929.

Gas Enrichment Summary.

The heavy hydrocarbons tend to decrease in percentage at the higher temperatures, while the methane increases. The calculated calorific value of the heavy hydrocarbons falls till after 800° is passed, after which it rises sharply. This may be accounted for by the fact that, of corresponding members of the three series of hydrocarbons dealt with, the olefines have the lowest calorific value per c.ft., the paraffins being somewhat higher, while the aromatics are greatly superior to either. Directly 800°, the optimum temperature under the given conditions for the formation of olefines, is exceeded, the rapid conversion into aromatic compounds takes place, with a consequent rise in the value of the gaseous hydrocarbons.

The calorific value of the oil gas, at its highest at 720° falls, and then rises sharply at 820°, while the volumetric yield first increases with temperature, and then drops slightly. The thermal yield rises gradually, and is highest at the highest temperature experimented with.

Effect of Variations in Oil Rate.

In the series of tests described above, we have seen the effects of increasing the cracking temperature on the resultant products, the oil rate being practically constant throughout. In the experiments of series C, the temperature was maintained at 770° C., which is that most usually employed in C.W.G. practice, for the first three tests, the rate of oil supplied to the carburettor being gradually increased. The fourth test, in which only gas enrichment results were noted, was taken over a day's working with the high temperature of 820° C. and a high oil rate.

Description of Plant Used. Series C.

The tests carried out under Series C were made on No. 2 plant, which was in general size and construction exactly similar to that previously described. There were, however, a few important differences between the two sets, which may be summarized as follows:

Control.	Cracking Surface.	Free Volume.
No. 1 Set. Hand-hydraulic	5535 sq. ft.	627 c.ft.
No. 2 Set. Automatic-hydraulic . .	6356 ,,	605 ,,

The difference in the ratio of surface to free volume was due to the use of ordinary soaps of 9 in. by 2½ in. by 2 in. in the superheater instead of chequers as were used in No. 1 set. The maker's idea was to increase the cracking power, but a comparison of the two based on the figures quoted by Griffiths, who found that 1 cub. in. of space had the same cracking effect as 4·75 sq. in. of surface, demonstrates that actually the oil cracking capacity of No. 1 set is 1 p.ct. higher than that of No. 2, and the fact that No. 1 was rather the better carburetting plant is borne out by a comparison of the results from the two, though admittedly other factors enter into the performance, such as different cycles used. The temperature control on No. 2 was more perfect than on No. 1, due to the continuous recording of the superheater base temperature on a Leeds and Northrupp potentiometer pyrometer.

Operating Cycle Used. Series C.

As No. 2 set was controlled automatically, a somewhat shorter and more efficient cycle was used than was practicable with No. 1 set. The gasmaking period commenced with a backrun of 55 seconds, steam being admitted at the rate of 39 lbs. per minute both at the top of the superheater and also in the transfer flue between carburettor and generator. Thus a total of 72·5 lbs. of steam was used on the backrun. The advantage gained by dividing the steam supply was that gasmaking started at once due to the direct inlet of steam, while the stack valve was sufficiently cooled by the other supply to ensure sweet working. During the up run of 2 minutes 40 seconds, steam entered at 75 lbs. per minute, while oil was admitted for 2 minutes 20 seconds, the automatic oil valve allowing a measured quantity of steam to purge the injectors. The blow consisted of 5 seconds purging and 2 minutes with the stack open. The whole cycle thus occupied 5 minutes 40 seconds.

Rate of Gasmaking.

The rate of gasmaking was observed minute by minute throughout a number of runs with 16 gallons of oil per run, the average results being as shown in Table V.

Table V.—*Rate of Gas Production No. 2 Set.*

Direction of Run.	Time (Seconds).	P.Ct. of Total.	C.W.G. Made.	B.W.G. Made.	B.W.G. per Minute.
Back . .	0·55	29·6	2218	2218	2420
Up . .	55–115	30·6	2299	1819	1819
,, . .	115–175	25·0	1870	1390	1390
,, . .	175–210	12·5	937	777	1162
Purge .	210–215	2·3	170	170	3400

Comparing these results with those shown for No. 1 unit on Table I., it is seen that the backrun on No. 2 is far more efficient, though at the expense of the forward gasmaking period. The average gas rate during the oil admission period is lower, but this will be largely set off by the lower percentage of steam decomposed.

Alteration in Composition of Blue Gas in Superheater.

It has been suggested that, as the water gas does not have time to come to the equilibrium conditions of the equation

$$CO + H_2O \rightleftarrows H_2 + CO_2$$

in the generator itself, it is probable that adjustments in its composition are made during its passage through the carburettor and superheater.

With this object in view, while making uncarburetted gas a number of tests were made with samples taken at the inlet of the carburettor and at the outlet of the superheater, with a delay of 5 seconds between the commencement of the two samples to allow for the time of passage. The two samples were drawn very quickly for only 15 seconds in order to minimize the variations due to the changing conditions of the fire. The practical difficulties in obtaining good samples are many, but from the consideration of a number of results, many of which were somewhat erratic, it would appear fairly certain that changes in composition do occur, governed by the original composition of the gas and the temperature of the vessels. Typical examples of tests are shown in Table VI.

Table VI.—*Changes in Composition of Blue Water Gas.*

—	Inlet Carburettor.	Outlet Superheater.	Inlet Carburettor.	Outlet Superheater.
CO_2 . . .	8·5	9·9	11·9	12·2
O_2. . . .	0·8	0·8	0·8	0·8
CO . . .	34·9	33·0	29·3	28·9
H_2 . . .	46·9	47·8	48·9	48·6
CH_4 . . .	1·2	1·3	1·2	1·2
N_2 . . .	7·7	7·2	7·9	8·3

It will be seen that the change is in the direction of forming more CO_2 and H_2 which would remove a small quantity of heat from the carburettor and at the same time decrease the undecomposed steam. The importance of the reaction as affecting the cracking conditions must be regarded as negligible.

Variations in Temperature of Carburettor.

Temperature readings were taken under the inlet arch support of the carburettor and just below the injectors with bare thermocouples, in order to observe the changes throughout the cycle. It was found that when a sheathed fire end showed an average of 755° C. below the injectors, the inlet pyrometer dropped from 900° at the end of the blow to 860° at the beginning of the up run and fell to 805° before the next blow, while the bare pyrometer below the injectors indicated 760°, 750°, and 735° respectively. The variations in the brickwork temperature due to oil spraying are thus much less than with the more common design of plant where the gas and oil enter at the top of the carburettor. In such a plant a variation of 300° C. is not uncommon.

Quality of Gas Oil Used. Series C.

During the interval that elapsed between the completion of Series B and the commencement of Series C, the properties of the gas-oil used changed somewhat. The following are the characteristics of the oil used throughout Series C.

Group analysis—	
Olefines	9 p.ct.
Aromatics	3 ,,
Paraffins and naphthenes	88 ,,
Polycyclic compounds.	Slightest traces
Specific gravity	0·862

Distillation Test.

Fraction, ° C.	P.Ct.	Cumulative, P.Ct.
To 100	0·4	0·4
100–200	1·0	1·4
200–210	0·6	2·0
210–220	2·4	4·4
220–230	12·8	17·2
230–240	18·8	36·0
240–250	13·0	49·0
250–260	18·2	67·2
260–270	11·5	78·7
270–280	6·3	85·0
280–290	4·2	89·2
290–300	3·2	92·4
300–310	3·0	95·4
Residue above 310 .	4·6	,,

This oil is somewhat lighter than that previously used, and contains a slightly higher percentage of paraffins. It is a very high-class gas-oil.

Test C. I.

Temperature at base of superheater	770° C.
,, below oil injectors	760° C.
,, at top of superheater	760° C.
Gas-oil used per run	9·84 galls.
,, ,, ,, minute	4·22 ,,
C.W.G. made per run	6900 c.ft.
Gas-oil used per 1000 c.ft.	1·425 galls.

Analysis of C.W.G.—

CO_2	5·9	
C_nH_m	4·3	
O_2	0·7	Calorific value. Aver.
CO	31·5	of hourly tests — 437
H_2	40·9	B.Th.U.
CH_4	10·2	
N_2	6·5	

Sp. gr. of tar	1·142
Total polycyclic compounds, calculated as $C_{10}H_8$	29·9 p.ct.

Distillation and Group Analysis of Tar.

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Sp. Gr.	Olefines. P.Ct.	Aromatics. P.Ct.	Naphthenes and Paraffins. P.Ct.
0–200	7·3	7·3	0·933	49	51	0
200–240	27·1	34·4	1·098	69	31	0
240–260	7·0	41·4	1·051	72	20	8
260–278	4·1	45·5	1·039	49	37	14
278–300	4·8	50·3	1·06	69	21	10

Group constituents in total fraction 0° C.–300° C.
Olefines, 65 p.ct.; aromatics, 31·8 p.ct.; paraffins and naphthenes, 3·2 p.ct.
The fractions distilling between 200° C. and 260° C. set quite solid at laboratory temperature.

Test C. II.

Temperature at base of superheater	770° C.
,, below oil injectors	755° C.
,, at top of superheater	760° C.
Gas-oil used per run	13·7 galls.
,, ,, ,, minute	5·88 ,,
C.W.G. made per run	7540 c.ft.
Gas-oil used per 1000 c.ft.	1·82 galls.

Analysis of C.W.G.—

CO_2	4·8	
C_nH_m	5·7	
O_2	0·5	Calorific value. Aver.
CO	32·5	of hourly tests — 460
H_2	37·6	B.Th.U.
CH_4	11·3	
N_2	7·6	

Sp. gr. of tar	1·11
Total polycyclic compounds, calculated as $C_{10}H_8$	26 p.ct.

Distillation and Group Analysis of Tar.

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Sp. Gr.	Olefines. P.Ct.	Aromatics. P.Ct.	Paraffins and Naphthenes P.Ct.
0–200	3·6	3·6	0·908	24	74	2
200–240	18·5	22·1	1·071	62	38	0
240–260	12·4	34·5	1·049	86	14	0
260–278	6·3	40·8	1·058	96	4	0
278–300	4·7	45·5	1·052	90	6	4

Group constituents in total fraction 0° C.–300° C.
Olefines, 73·1 p.ct.; aromatics, 26·4 p.ct.; paraffins, 0·5 p.ct.

Test C. III.

Temperature at base of superheater	770° C.
,, below oil injectors	750° C.
,, at top of superheater	765° C.
Gas-oil used per run	17·9 galls.
,, ,, ,, minute	7·68 ,,
C.W.G. made per run	7320 c.ft.
Gas-oil used per 1000 c.ft.	2·45 galls.

Analysis of C.W.G.—

CO_2	6·2	
C_nH_m	6·7	
O_2	0·6	Calorific value. Aver.
CO	30·5	of hourly tests — 503
H_2	33·5	B.Th.U.
CH_4	13·9	
N_2	8·6	

Sp. gr. of tar	1·058
Total polycyclic compounds, calculated as $C_{10}H_8$	21·9 p.ct.

Distillation and Group Analysis of Tar.

Fraction. °C.	P.Ct.	Cumulative. P.Ct.	Sp. Gr.	Olefines. P.Ct.	Aromatics P.Ct.	Naphthenes and Paraffins. P.Ct.
0–200	10·2	10·2	0·902	45	55	0
200–240	28·5	38·7	1·036	52	26	22
240–260	14·6	53·3	1·033	70	20	10
260–278	8·1	61·4	1·020	78	16	6
278–300	5·5	66·9	1·026	86	10	4

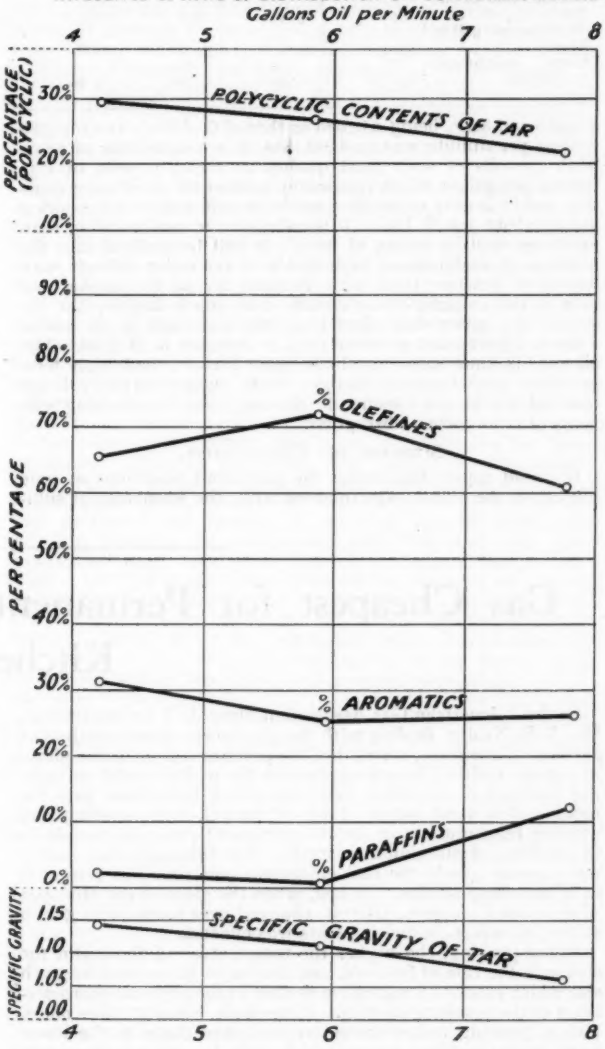
Group constituents in total fraction, 0° C.–300° C.
Olefines, 60·8 p.ct.; aromatics, 26·6 p.ct.; paraffins, 12·6 p.ct.

Comparison of Results.

Graph No. 2 illustrates the varying characteristics of the tar formed due to less drastic cracking conditions as the oil injection rate increases. It will be noted that the changes in this series are much more gradual than in Series B, no critical point having been reached where the tar suddenly becomes completely of an aromatic nature. It is also noteworthy that the polycyclic bodies calculated as naphthalene are decidedly higher, although, on the whole, the tars do not show evidence of being as highly cracked. For example, Tests B. III. and C. II. are most nearly comparable as to temperature and oil rate; but in the former we have 65 p.ct. of olefines and 32·7 p.ct. of aromatics in the fraction to 300°, while the polycyclic bodies in the

GRAPH Nº2.

INFLUENCE OF RATE OF OIL INJECTION ON COMPOSITION OF TAR



tar are only 18·9 p.ct.; whereas in C. II. the olefines are decidedly higher at 73·1 p.ct., the aromatics only 26·4 p.ct., and the whole tar shows 26 p.ct. of polycyclics. As the temperature and concentrations were similar, it is a matter of interesting speculation as to whether the altered surface-volume ratio has been responsible for the increased tendency to form condensed multi-ring compounds.

Gas Enrichment Results.

Table VII. shows the efficiency of gasification of the oil and the properties of the oil gas produced in the tests of Series C. These results are calculated on the same lines as those given in Table IV.

Discussion of Gas Enrichment Results.

As is to be expected, the highest thermal yield from the oil is obtained at the lowest rate of injection, thus the enrichment results of C. I. with the cracking temperature of 770° are only approached by B. V. where 820° was used. C. III. shows clearly the poor results obtained with a high oil rate and moderate temperature, these being comparable with B. I. where the temperature was only 720° but coupled with a lower oil rate. C. IV. illustrates the desirability of increasing the temperature with the oil rate, the thermal yield here, using 7·94 gallons per

TABLE VII.

Test No.	C. I.		C. II.		C. III.		C. IV.	
Galls. oil per min.	4·22		5·88		7·68		7·94	
,, ,, ,, 1000 c.ft.	1·425		1·82		2·45		2·34	
Cracking temperature	770°		770°		770°		820°	
Gas analysis—								
CO_2	5·9	5·7	4·8	4·3	6·2	5·8	6·4	6·1
C_nH_m	4·3	4·7	5·7	6·3	6·7	7·4	6·9	7·6
O_2	0·7	..	0·5	..	0·6	..	0·5	..
CO	31·5	34·2	32·5	35·7	30·5	34·0	28·8	31·6
H_2	40·9	44·4	37·6	41·3	33·5	37·3	36·7	40·2
CH_4	10·2	11·0	11·3	12·4	13·9	15·3	13·2	14·5
N_2	6·5	..	7·6	..	8·6	..	7·5	..
Calorific value of C.W.G.	437		460		503		508	
Calculated calorific value of C_nH_m	2420		2200		2400		2420	
Calorific value of oil-gas	1450		1545		2138		1665	
C.ft. oil-gas per gallon of oil	93·4		78·5		51·0		71·8	
Therms enrichment per gallon	1·35		1·20		1·09		1·20	

minute and 820°, being as good as that of C. II. where only 5·88 gallons per minute was gasified, but at a temperature of 770°. With gas-oils of such good quality as these, a yeild of 1·30 therms per gallon might reasonably be counted as efficient practice, and it is easy to see that to obtain this yield when making gas of about 500 B.Th.U. it is necessary to use cracking temperatures well in excess of 800°. It will be realized that the problem of maintaining high yields is far more difficult with American practice than with British; for in the former not only is the calorific value usually very much higher, but the output of a given sized plant is greatly increased by the use of a much higher blast pressure than is common in Britain. The oil rate is thus raised by both these factors, and high temperatures with frequent changes of the chequer brickwork are resorted to, as old chequer brickwork loses its cracking efficiency due to carbon absorption.

SUMMARY AND CONCLUSIONS.

It would appear that under the prevailing conditions of time contact in the plants experimented with, the formation of sufficient naphthalene to saturate the gas at the outlet of the condenser is inevitable, and it has been shown that this production of a non-gaseous and objectionable compound is not accompanied by a decrease in the enrichment results obtained and which are commonly regarded as efficient practice. It is probable that the fact that little trouble through naphthalene stoppages is caused when distributing pure C.W.G., as is common practice in North America, or a mixture of some 30 p.ct. C.W.G. with coal gas in Great Britain, is due to the presence of sufficient light hydrocarbons of similar vapour tension which condense out with the naphthalene and carry it to the syphons. It is, therefore, only when the distribution system is already strangled by existing deposits, which it is desired to remove by re-evaporation into an unsaturated gas, that the presence of naphthalene in C.W.G. can be considered objectionable. In cases such as these, resort must be had to washing the C.W.G. with gas-oil, as little being used as is absolutely necessary to reduce the naphthalene saturation to an acceptable figure, in order to avoid removing useful light hydrocarbon vapours. The gas-oil so used may be mixed into the bulk supply to the carburettor, as described by H. H. Thomas;* the naphthalene so removed from the gas is in this way transferred to the tar, as the gas cannot carry any more. It is probable that this method actually checks the formation of naphthalene from the oil, by increasing its vapour pressure in the superheater, and thus changing the cracking equilibrium.

When using any given gas-oil, once experience has been obtained, an analysis of the tar forms a most useful guide to the completeness of the cracking. Taken in conjunction with a study of the gasification results as calculated by the Pacific Coast Method, a fairly complete mental picture of the operation can be formed, and in this way optimum conditions can always be maintained.

Interesting lines of investigation would be into the use of catalysts to enable lower cracking temperatures to be used, and into the most desirable surface-volume ratio for the cracking vessel, the object being in either case to increase the yield of methane and the gaseous olefines, bearing in mind that there are no aromatic compounds which are gaseous at atmospheric temperatures.

* "GAS JOURNAL," May 23, 1928.

Gas Cheapest for Permanent Mould Method of Casting Kitchenware

In the "American Gas Association Monthly" for September, Mr. J. B. Nealey, dealing with the permanent mould method of casting kitchenware, states that the practice is to melt the alloys in regular melting furnaces, transfer the molten metal to holding furnaces or crucibles, and pour direct from these into the moulds with hand ladles. Lack of control of the melting and pouring temperatures is the most frequent cause of trouble in the making of aluminium castings. For this and other economic reasons gas is the fuel employed, and time has proved it to be the cheapest also. In fact, when the plant of the Monarch Aluminium Company, Detroit, changed over from oil to gas, a saving of 30 p.ct. in melting costs was effected.

When pouring, the higher the temperature of the metal the slower is the rate of freezing, and the larger the crystal or grain size which causes a progressive decline in the physical characteristics of the resulting casting. If too high, burning takes place. Hence, pouring temperatures are narrowed down to the lower limit of the melting range, which calls for close temperature control, which in turn dictates the use of gas fuel.

Several types of melting furnaces are used in this plant, the most common being a cylindrical oscillating type consisting of a steel retort that is lined with refractory material, which is set in a suitable frame. The furnace chamber or retort is made of steel plate with cast-iron heads and cast-steel collar around the pouring opening. A refractory-lined, cast-iron door, with a vent hole, clamps tightly down on the steel collar when the furnace is in operation. This retort rests on cast-iron stands bolted to a heavy bed plate, and revolves on steel rollers by means of a worm and gear, motor operated.

The retort is split longitudinally, hinged at the back, and held together with bolts, so that it can be re-lined with the greatest ease. It is heated directly with a gas burner firing into it through one end. The melting speed is increased by rotating the furnace through 180°, or nearly to the pouring point, as soon as it is lighted up, allowing it to remain in this position for 15 minutes, and then rotating it to the opposite side a similar amount and for a similar period. This oscillating motion is continued until the metal is ready. These furnaces are of 2000 lbs. capacity each.

The holding furnaces consist of upright steel shells, brick lined, in which crucibles are held. The firing system consists of a single gas burner, located at the bottom, the flames impinging on the crucible tangentially. The metal in these crucibles, which are of 400 lbs. capacity each, is maintained at the correct pouring temperature by means of thermocouples and automatic temperature controls.

Some of the castings produced in this plant are annealed, others are heat treated, but all pass through the machine shops where are located batteries of band saws for gates and risers, grinders, &c., and rows of lathes, drill presses, tapping machines, polishers, buffers, &c. Final cleaning is accomplished in a washing machine consisting of a rectangular steel shell equipped with a travelling conveyor of steel mesh. A series of nozzles through which hot washing solutions are forced in needle sprays are located in the first part of this machine, while a row of gas burners transforms the latter portion into a drying oven.

Gas-fired furnaces are also used for annealing and heat treating. For removing casting strains the parts are heated in an oven to 280° Fahr. and allowed to cool slowly with the oven. The heat treatment of these castings consists of heating to the required temperatures and quenching in boiling water, cold water, or oil, and ageing in air.

When quenched the material is almost as soft as when in the annealed state, but increases in hardness and strength (tensile and yield point) when allowed to stand at room temperature. While this ageing action is rapid at first, it slows down gradually, being completed in from 4 to 10 days. There is little or no loss in elongation, but there is a decided decrease in plasticity. Some alloys require a second heating and quenching to get the maximum effects, while others age spontaneously at room temperature. Hot air blast or steam is sometimes used in the place of water for quenching.

After the material has been brought up to the temperature for heat treating (920°-980° Fahr.) it must be soaked for time periods varying all the way up to 12 hours before quenching. This, of course, varies according to cross-section of the casting, chemical analysis of the material, and physical properties desired. Here again absolute temperature control is essential, for if the heat is too low the effects desired will not be obtained, and if too high partial melting and burning, together with loss in strength and ductility, will follow.

Preparation of a New Road Binder

The following is Mr. C. F. Broadhead's reply to the discussion on his paper before the Institution of Gas Engineers at the Annual Meeting in Leeds last June.

In a written reply, the author says he desires to thank Mr. Bloor sincerely for introducing the paper on his behalf, the more so as Mr. Bloor evidently found the subject little to his taste. Mr. Bloor stated that the paper took for granted many things which were entirely opposed to English experience and his own views. The English experience is referred to in vague and general terms, and may be summed up in the statement that the work was done by the distilling industry, which deals with a blended product consisting of horizontal, vertical, and coke oven tar, and which was in the habit, in so far as it produced road tars, of treating and blending the crude tars in such a way as to produce a properly constituted road tar for road-making material. It would have been much more convincing if Mr. Bloor had been able to put forward some concrete evidence that his so delightfully expressed sentiment was an accurate survey of the position. In the absence of definite proof from any quarter, it can only be assumed that horizontal, vertical, and blended tars are still much in the same category—viz., good, bad, and indifferent. The coke oven tar producers appear well able to speak for themselves.

Turning to Mr. Bloor's own views one may infer from the many inaccuracies and queries that he had too little time in which fully to digest the paper. Mr. Bloor states that the conditions are definitely Australian and do not apply to the old country; the coals carbonized are Australian coals, and to a very large extent the individual companies were the distillers. The facts are that for the past twelve months during which the Bitural process has been inaugurated on a considerable scale, the whole of the coal carbonized (330,000 tons) at Melbourne has been South Yorkshire coal shipped at Hull or Immingham. Further, no distillation whatever was carried out either at Brisbane or Melbourne until the conditions brought about by the production of vertical tar forced the Gas Companies themselves into an attempt to cope with the situation.

Mr. Bloor is in error in referring to the addition of asphaltic oil to the ordinary distillation process at Brisbane. It refers to the latest Bitural practice at Melbourne, and it is difficult to understand how any other interpretation could be placed upon the supplementary information sent to Leeds. Mr. Bloor, with subsequent speakers, was again quite wrong in assuming that the author had not the slightest comprehension of the causes which contributed towards the set of figures quoted in connection with the decline in the price of tar. The construction applied by Mr. Bloor, that the whole of the drop in tar prices was due to inferior vertical tar, was certainly not intended by the author. The position in Australia was definitely brought about by unsaleable vertical retort tar in a strictly limited market, the corresponding state of affairs in England mainly by the two factors mentioned by Mr. Copp—German competition and reduced creosote exports to America. The author is still of the opinion that "when it became necessary to revert to the production of road tars to a greater degree" the distillers found the home market generally in a bad way. How far the effects of vertical tar contributed is, no doubt, a debatable point, but in stating that it had "an infinitesimal, if any, bearing on the facts," Mr. Bloor does himself less than justice and the industry no service.

Mr. Bloor disagrees with the adverse attitude taken towards the cracking of vertical tar as a method for improvement, and cites the example that the superiority of horizontal retort tar is due to cracking. Quite so, but horizontal tar is a "cracked" product of a primary tar, and not of a vertical tar. In vertical tar the paraffin series and the transition group of products formed in the pyrolytic synthesis of the aromatic series are present to a much greater degree than in horizontal tar, and it would be difficult to arrange selective cracking apparatus that would satisfactorily "crack" this series without causing deterioration of the aromatic hydrocarbons present.

With regard to hydrogenation, Mr. Bloor said that he did not think that those familiar with the subject would accept the statement. By a coincidence, the opinion expressed in the paper is that of an official of the largest company in Australia who was sent abroad specially to investigate the problem of hydrogenation of carbonaceous materials.

With reference to Mr. Bloor's criticism of the ductility of Bitural pitch. Since writing the paper the product has been improved to such an extent (by the substitution of asphaltic oil for the tar oils) that the pitch on distillation to 300° C. has now a ductility of 110+ at 77° F. It would have been useful if Mr. Bloor had quoted figures showing the ductility of the pitches of tars from various English gas coals after distillation to 300° C.

The weathering test referred to is a simple performance. A sample of bituminous material is taken and heated in an oxidizing atmosphere to 160° F. for 8 hours, and the degree of hardening during that time obtained by means of a penetrometer. The hardening is due to three factors: (1) Loss of oils; (2) oxidation; (3) polymerization.

It is more than surprising to hear that the tests for weathering bear no relation to anything customary in the old country. This, if correct, may account for the fact that the difference between the product of horizontal and vertical retort tar has gone so long unnoticed. Nevertheless, it is well-nigh incredible that tar distillers could be more concerned with specific gravity and what not than with the durability of their product. Excellent methods for more completely testing the weathering properties of bituminous materials are given in the recent edition of "Asphalts and Allied Substances" by Abrahams.

Concluding his remarks, Mr. Bloor wished to stress the fact that it should be abundantly clear that Australian conditions differed very greatly from those in the old country, so that necessary allowance must be made for that fact in considering the case presented by the author.

Speaking with the utmost friendliness as one Englishman to another—to paraphrase "Mrs. Cheyney," who after all hailed from Clapham, not Australia—the author is content to leave the decision as to who is in possession of the facts to the considered judgment of those with sufficient impartiality and ability to recognize them.

Mr. Copp claims that it is possible to produce an excellent road tar from vertical retort tar. It may be so, but Australian companies would have saved enormous sums if the process had been confided to the world at large rather than kept the secret of the select few. Mr. Copp states that the author has condemned root and branch the cracking of tar in order to make it suitable for roads. Is this really the case? In no part of the paper has ordinary distillation of horizontal tar been condemned. Exactly the reverse has always been conceded. At Brisbane, using Queensland coal (almost identical with second grade South Yorkshire), the output of horizontal tar was purchased and distilled by the City Council with most excellent results. In Melbourne, with Maitland coal, carbonized in either horizontal, inclined, or intermittent vertical retorts, the figures quoted as taken by the distillers and municipalities prove the satisfactory nature of the resultant material. When continuous vertical retorts were introduced in both cities, however, the sale of tar for road-making fell to a most alarming and costly extent. It seems unnecessary to say more. Mr. Copp admits that the figures tell a sorry story of the fall in the value of tar from 9d. to less than 3d. per gallon during the past ten years. It would be instructive to learn what amount of tar was used for road-making in 1920, also what price was paid per gallon for that purpose. Mr. Copp says it would be impossible to incur the cost of the Bitural process in England—say, 1d. per gallon—for if surveyors were asked to pay an extra 25 to 30 p.ct. for a special tar their answer would be disappointing, to say the least. Having in mind the opinion of many surveyors on the value they have obtained in the past, my view is that their attitude might be distinctly encouraging. If they were offered material giving double or treble the life, they should be prepared to pay 1d. per gallon more, as the cost of the binding material is small compared with the total cost of road construction. The price of tar to Melbourne distillers is 3d. per gallon, and the price of Bitural by contract to the largest purchasers 6½d. per gallon *plus* cost of containers. Mr. Copp's observations regarding specific gravity, viscosity, and specifications will be welcomed by everyone desirous of clearing up the unsatisfactory position in this respect. In Melbourne it may be said that, so far as the Metropolitan Gas Company, the distillers, and tar users are concerned, the standard type of specification is of little interest or utility.

Mr. Copp thought the absence of any attempt to explain the difference between climatic conditions in England and Australia a grave omission. The Brisbane climate is subtropical, exceedingly hot for at least six months in the year, but having a few perfect winter months with very little frost. The Melbourne climate, apart from the longer and hotter summer and the absence of snow and severe frost during the winter, is much the same as that of any English city. A parallel reply to the discussion regarding the effect of using English or Australian coals is therefore possible. Distilled horizontal tar was satisfactory; distilled continuous vertical tar quite useless in both climates.

Col. Carr considers that the price of road tar has not only been maintained in relation to the price of bitumen, but that in the past three years has been relatively improved, and that with the co-operative schemes which were in operation it had been possible to produce a standard product. It would be exceedingly interesting to know, if it could be computed, the proportion of the advance in price due to co-operative schemes and that due to the standardized product. Col. Carr

stated that the paper goes to show that the old country was not falling behind the times, but was in fact advancing. This is a matter for congratulation in contradistinction to what it has been found possible to read into my communication. It is news in this part of the world that the deterioration and loss in elasticity of bitumen due to weathering was very much greater than was the case with the average prepared tar.

Mr. Madden agreed with Col. Carr that the value of tar for road-making had increased very much during the past five years. This is possibly correct. In the same period the price of crude tar dropped approximately 10s. per ton, which would go a great distance towards paying the extra cost of manufacturing in England a stable and standard commodity such as Bitural. Furthermore, he said it should not go out from the meeting that vertical tar was not eminently suitable for road-making if properly made up. Mr. Madden displays the same reticence as other speakers regarding the precise make-up. Surely some authority on the blending of horizontal, coke oven, and vertical tars could have supplied the details. Mr. Madden refers to the absence of gummy deposits in his meters, and attributes presence of gumminess to oxygen. It may be of interest to Mr. Madden that gummy deposits have been found in meters passing gas containing 0·5 p.ct. oxygen. Admittedly oxygen accelerates polymerization, but there are other accelerants also—hydrocyanic acid, for example. It has been our experience that the position of the consumer's meter greatly influences the deposition of gums. In meters that have been exposed and subjected to greater ranges of temperature the light oil deposited is evaporated during periods of elevated temperature, leaving the gummy polymer behind. According to the researches of Prof. Hurd, indene polymerizes at 300° C. in the presence of an inert gas, and thus may be present in the polymeric form before leaving the works; also Lebedev tells us that styrene will polymerize in the presence of CO_2.

Dr. Smith was impressed with the fact that the Bitural process did not attempt in any way to produce a tar which would conform to the British Road Board specification. It was a means of producing an artificial bitumen. This precisely and correctly sums up the situation. It has been the aim to produce a material as nearly approaching the highest grade bitumen as possible, with the object of obtaining a price comparable with that of bitumen having due relation to the value of each product. We have been more concerned with altering the molecular architecture of the tar, and rendering it stable and weather resisting, than with specific gravities, viscosities, and distillation ranges. His observations regarding the question of the specification are exactly in line with the conclusions reached in Australia. The specification attempted to make certain that the tar produced was a satisfactory road tar. This procedure admittedly gives quite good results in connection with straight distilled horizontal tar, but, according to Dr. Smith's remarks, does not meet the case when applied to vertical tars. He also stated that there was no test which was conclusive and final in ascertaining what was a satisfactory road tar.

The latter point assumed increasing importance as the Melbourne investigations proceeded. A supplementary addition to the paper was sent home by air mail describing a method of testing which had come under our notice. The following is an extract from this supplement:

> It has been long felt that the specifications for road tars are by no means a guide to the adhesive, binding, and lasting qualities of the material, and that a supplementary test, yielding information along these lines, would be of great value. In "Roads and Road Construction" for February last is an article by R. Loman, of the Netherlands Government Department of Roads, entitled "A New Method of Testing the Quality of Road Tar." The essence of this article infers that the binding power which determines the mechanical stability of tar is due to the number and state of protection of ultra-microscopic carbon particles which form a disperse system presenting an enormous total area. These ultra-microscopic particles do not clog or settle, because they are enveloped in protective bodies, and only high temperatures or some chemical reagent can destroy this protective bond. In the case of bitumen the state of protection is greater than in tars; thus tars deteriorate more rapidly if overheated.
>
> A high ultra-microscopic carbon-particle number indicates not only that the tar contains a large number of carbon particles per unit volume, but also that these particles are well protected and well dispersed. Thus the more carbon particles per unit volume the better suited is the tar for road construction purposes.
>
> In order to determine the place of Bitural among the various road-binding materials, samples of definite concentrations in ultra-benzene were sent to the Melbourne University to be examined under the ultra-microscope to determine the number of carbon particles per unit volume. In preparing these samples all free carbon was filtered off beforehand.
>
> Prof. Hartung's results are as follows:
>
> *Crude Vertical Tar.*—This solution was found to be optically almost empty in the thin layer examined. A few brightly shining and therefore comparatively large particles were observed without brownian motion.
>
> *Distilled Vertical Tar.*—This solution showed fairly numerous and comparatively large particles in slow brownian motion.
>
> *Bitural.*—This solution showed more numerous and generally smaller particles than the distilled tar.
>
> Taking the field on each plate to represent a volume of 0·0004 cub.mm., the estimate of the particles per c.c. is as follows:
>
> | | | |
> |---|---|---|
> | Crude tar | 4×10^7, or | 40 million per c.c. |
> | Distilled tar | 4×10^8, ,, | 400 ,, ,, ,, |
> | Bitural (tar oil) | 17×10^8, ,, | 1700 ,, ,, ,, |
> | Bitural (asphaltic) | 5×10^9, ,, | 5000 ,, ,, ,, |
>
> With the three tar materials the tests may be taken as being comparable.
>
> A sample of bitumen was also presented for examination, but it was impossible to count the carbon particles accurately owing to their fineness and brownian motion.
>
> An examination of the ultra-micro photographs shows the superiority of Bitural over distilled tar. A further examination of the photographs indicates that the nature and dispersion of the particles in the bitumen are very different from those in the tar, due to its different origin, and therefore its comparison with the tar materials is merely relative.

The supplement either did not arrive in time for presentation at the meeting or may have been too late to be dealt with. These particular tests seem to be what the tar distilling industry has lacked, and may provide information regarding the suitability of road-making material acceptable to all interests.

Dr. Smith admits that there have been many difficulties in dealing with vertical retort tar, particularly in those districts where there is no possibility of sending the tar to central distilleries for more elaborate treatment; but he states that, at the same time, of a very large number of samples of continuous vertical tars only a small fraction have not been amenable to treatment by means which are simple and which will give a first-class road tar. There can be no hesitation whatever in accepting the statement of Dr. Smith; and doubtless he will, in due course, make available all information on the subject. The Bitural process was submitted to his firm with the idea that it might be of some value to those undertakings which had suffered—by what particular chain of circumstances is of no consequence in the ultimate analysis—the same set-back financially in receipts for tar as that experienced in Australia. The process will inevitably stand or fall on its merits in competition with any other method. If it does not succeed its sponsors will be the first to admit that conditions in England and Australia are not comparable.

Mr. Sensicle said it might be contended that there was something in what the author said about the effect of unsaturated hydrocarbons in road tar being to form brittle compounds on exposure on the road. This has proved a very important factor indeed. The process appears interesting technically but doubtful commercially to Mr. Sensicle. However, the point raised by him regarding the cost of bitumen in the Commonwealth last year being 4·8d. per gallon evidently refers to the Home Invoice value *plus* 10 p.ct. upon which the official figures supplied by the Department of Trade and Customs are based. The lowest price—within our knowledge—ever quoted in Victoria was 6·7d. per gallon *ex* ships' slings. In ascertaining the profits we assumed a value for Bitural, as Mr. Sensicle states, of 6d. per gallon. As mentioned in the reply to Mr. Copp, the price at the moment is 6¼d. net for large quantities. Mr. Sensicle suggests that the calorific value of the gas might have some influence on the character of the tar produced in continuous vertical retorts, also that the greater the steaming the greater would be the amount of unsaturated compounds. It is the firm belief of the author that the high calorific value of the gas supplied in Melbourne, 550-560 B.Th.U.—owing to the 15 candlepower standard still being in force—has a good deal to do with any difference in the tar compared with that of other undertakings. But, as practically no steaming is done, the second portion of Mr. Sensicle's remark does not apply.

Mr. Sensicle had experience of the polymerization of unsaturateds to form gummy deposits, but curiously enough it was associated with horizontals and not vertical gas. The information regarding the circumstances is certainly exceedingly interesting.

With regard to the question of water soluble tar acids in Bitural, as they have been converted to formaldehyde condensation products they would not be soluble in water, so by the use of Bitural the streams would remain free from contamination.

Mr. Firth stated that a warning note had been sounded which justified a careful examination of the tar situation in the old country. With this view the author more than ever agrees. The substitution of another product for a formaldehyde condensation product would entail considerable investigation, as

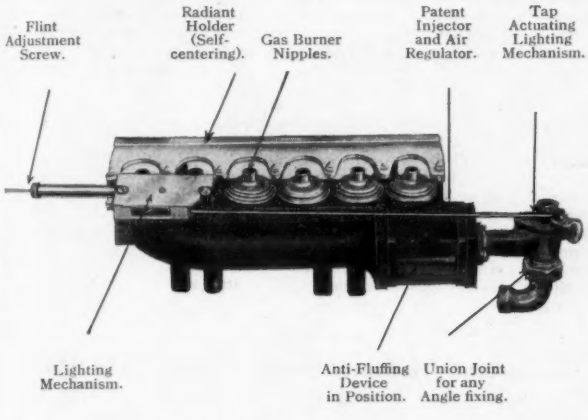
it is not merely the acidity of the tar acids that inhibit polymerization. Thus the mere addition of an alkali would not suffice. Mr. Firth's remarks relating to the inhibitors and accelerators and methods other than formaldehyde condensation for fixing tar acids are being closely investigated in the Company's research laboratory, and appreciation is expressed for his helpful criticism. His question regarding the nature of the damage to meter leathers by unsaturated bodies will be answered in the near future, when a paper to be read by the Chief Chemist of the Company before the Australian Gas Institute will be made available through the Technical Press.

In conclusion, the author anticipated that more detailed and constructive criticism of the process would be forthcoming from members interested in research on the constitution of vertical tar and its treatment for road-making purposes, also that the structural details of the plant would have drawn some comment from those interested in tar plant construction. The feeling of disappointment at the almost negative result is offset to some extent by that of gratitude to those members who paid him the compliment of carefully perusing the paper. Unlike the distillers, however, the author regrets his lack of ability to produce from the general material provided by the discussion a properly blended reply likely to meet with the approval of all concerned.

Self-Lighting Gas Fire

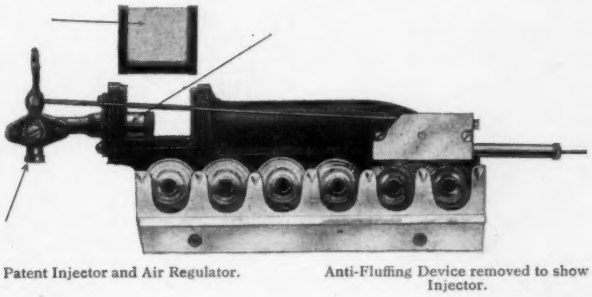
One of the chief advantages of the gas fire is its convenience, and this feature has been enhanced by the incorporation in a new pattern of fire manufactured by Regent Malleable Castings, Ltd., Bradley, Bilston, Staffs., of an ingenious automatic lighting device which requires no by-pass and is wholly concealed under the fender of the fire. Fitted with this device, a gas fire may be aptly described as " automatic luxury " at little cost.

The igniting mechanism, which consists of flint and steel, is operated by the gas tap, and is guaranteed to light the fire over eight thousand times. Assuming that matches cost a penny for fifty, this represents a saving of 13s. 4d., apart entirely from considerations of convenience. The setting of the spark ensures that the gas is ignited at the proper moment, thereby preventing backfire. The position of the automatic lighter in relation to the burner will be seen from the two photographs which we reproduce. These photographs indicate the different parts of the burner. Before briefly describing this, however, we would emphasize that replacement of the flint, which is only necessary after about 4000 times of lighting of the fire, takes about a minute. The flint holder and adjustment screw are placed in an accessible position; replacements and adjustments may be made without removing any part of the fire, and the amount of available flint can be seen at a glance. These may appear to be minor points, but they are important as indicating that the ignition device is essentially practical. Perhaps the most interesting feature of this lighting device is that the opening of the gas tap operates the spark—in other words, turning on of the gas is all that is necessary to ignite the fire.



The burners fitted to all fires manufactured by the firm are standard, and embody fixed air port and variable gas admission. The burner nipples ensure quiet flames, and the injector, which is adjusted by hand-operated micrometer screw, gives a good range of cone adjustment. The burner tube itself is nicely proportioned. The air port is covered with a spring-clip gauze which prevents foreign matter being drawn into the burner and thereby tending to stop-up the burner nipples.

The fire itself is of cast iron, and the design is such as to ensure efficient ventilation of the apartment in which it is fitted; all fires are guaranteed to conform to the " Lancet Test." The radiants are composed of material which give high emission of short-wave rays. By means of a special tap and union joint, the fire may be fitted from any angle, and the fire, which is known as the " Regent Matchless," is finished in egg-shell black or vitreous enamel, black, brown, or French grey. The manufacturers supply the fire in three patterns—five, six, and seven radiants. They also supply complete installations comprising surround, hearth, plate, and kerb, at prices which should appeal.



Treatise on Bread Baking

The American Gas Association have recently issued a brochure on bread baking which should prove of considerable value to gas companies and baking establishments alike. This appears under the title, " The Application of Heat to Bread Baking," and represents a complete report covering the two and a half years' work conducted at the American Institute of Baking, under the auspices of the Committee on Industrial Gas Research of the American Gas Association.

This research, explains the " American Gas Journal," was undertaken for the specific purpose of determining the best method of heat application to the operation of bread baking and the part which fuel gas played in such application.

The work contains a detailed account of the various tests, as well as charts, data, &c.

A review of the results follows:

(1) Bread has been baked in two commercial travelling ovens in the same bakery from the same batch of dough, one oven heated mainly by radiation and the other mainly by convection. No appreciable differences in the external and internal characteristics of the resultant bread was noted.

(2) Bread has been baked in an atmosphere of unburned city gas. No adverse effect was detected as to flavour.

(3) Bread has been baked simultaneously from the same batch of dough in three experimental ovens under conditions of control which at the time had not achieved a high degree of refinement, and notwithstanding the resulting bread showed similar characteristics with the exception of one oven, which invariably showed a thicker crust formation. The reasons for this have been set forth. Repetition of these tests subsequently under conditions of close control, developed in the course of the research, duplicated the above results.

(4) Results obtained from the earlier experiments indicated an apparently greater shrinkage loss in the convected heat oven as compared with the low-temperature radiant heat oven. This discrepancy was demonstrated as being due to the underbaking of the sides of the intermediate loaves in the pan strap in the radiant heat oven. Increasing the pan spacing in this oven resulted in a shrinkage loss equivalent to that in the convected heat oven.

(5) In the course of this investigation an instrument was devised for the purpose of rapidly determining the degree to which bread had been baked. This instrument, called the " Penetrometer," has made possible a convenient standard of reference necessary to the successful prosecution of this research. It may have possibilities of application in commercial baking control.

REGISTER OF PATENTS

Automatic Manufacture of Water Gas. No. 311,279.

HUMPHREYS & GLASGOW, LTD., of Victoria Street, Westminster (Assignees of PARSONS, M., of Delaware).

No. 14,070; May 6, 1929. Convention date, May 8, 1928.

The purpose of this invention is to provide an arrangement in which individual control mechanisms are employed driven by an electric motor or motors with which is combined an electric motor driven master automatic control machine which will start the water gas control machine at the proper time in a predetermined sequence, will signal the gas maker at the control machine when it is started by the master machine, and will take out of service a particular water gas machine if, for any reason, it accidentally gets out of step with the other machines in the works. Another purpose of the invention is to permit some of the steps recited to be performed by the operator in response to the timing device of the master automatic control machine. The specification is illustrated by nine diagrams.

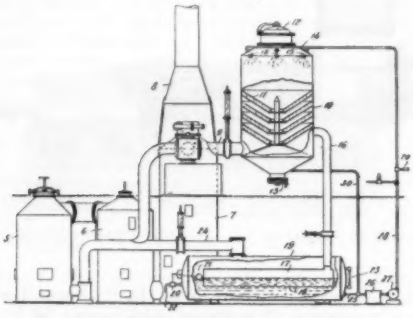
Steam Generation by Waste Heat from W.G. Plants.—No. 333,472.

SEMET-SOLVAY ENGINEERING CORPORATION, of New York (Assignees of STEERE, F. W., of Scarsdale).

No. 34,714; Nov. 13, 1929. Convention date, Nov. 17, 1928.

This invention may be applied to water gas sets of different design and construction.

Referring to the drawing, 5 indicates the generator, 6 the carburettor, and 7 the superheater of a water gas set. During the blow period air alone is introduced at the bottom of the generator, and passes successively through the generator, carburettor, and superheater to the top of the latter, and, in the absence of a waste-heat boiler or a flash boiler, it is discharged through a stack cap 8.



Steam Generation in W.G. Plants.

In accordance with the present invention, the blow gas is delivered from the superheater 7 through a pipe 9 to a flash boiler 10 which may be generally cylindrical in form and constructed with sufficient strength to withstand the pressure of the steam generated therein. The boiler is provided with a plurality of heat absorbing surfaces 11 so disposed as to permit the circulation of the gas thereabout and the absorption of heat therefrom. The gas escapes from the top of the boiler through an outlet which may be closed by a cover 12. The boiler may be provided with an opening at its bottom, normally closed by a cover 13, to permit the withdrawal of accumulations of finely divided solid material which is carried along with the gas and separated in the boiler.

At the commencement of the make, the gas is diverted from the flash boiler and at the same time water is introduced through a pipe 14 and directed by spray nozzles 15 on to the heated surfaces within the boiler. The steam is withdrawn through a pipe 16 and is delivered thereby to a distributor 17 having openings 18 in the bottom thereof. The distributor may be generally cylindrical in form and is disposed within a heat transformer 19, also of cylindrical form and constructed with sufficient strength to resist the pressure of the steam developed. The openings in the distributor 17 are disposed beneath the level of the water which is maintained in the transformer, the level being kept constant by means of a valve 20 controlled by a float 21, the valve being disposed in a pipe 22 which is connected to a source of water. A sight glass 23 at the end of the heat transformer enables the operator to see that the proper conditions are maintained.

The steam, which leaves the boiler in a highly heated condition, is mingled with the water in the heat transformer. The heat carried by the steam evaporates a portion of the water, thus affording an additional supply of steam. The temperature of the water in the heat transformer is raised, and the heat carried from the boiler is thus conserved. The steam from the heat transformer is delivered through a pipe 24 to the generator 5 and is utilized therein for the purpose of the operation.

The water which is heated in the heat transformer 19 may be delivered through a pipe 25 and strainer 26 to a circulating pump 27 which returns it through a pipe 28 to the pipe 14. Additional water may be supplied to the pipe 28 through a pipe 29 from any source thereof. Water which is not vaporized in the flash boiler 10 is returned through a pipe 30 to the pipe 25 and is thus re-circulated. The heat carried by this water is thus retained in the system. Owing to the preheating of the water, the flash boiler acts more efficiently, and it can be maintained in continuous operation because the excess heat which is carried away with the steam is promptly returned to the boiler in the preheated water.

The operation of the apparatus does not interfere with the normal operation of the water gas set. If the water gas set is operated in two cycles, including an "up-run" and a "back-run," the latter cycle may follow the up-run while water is still being supplied to the flash boiler for the purpose of producing steam. In the back-run the water may be supplied from the heat transformer to the superheater, or water from any suitable source can be introduced thereto. It is also possible to introduce steam from the heat transformer to the superheater through a suitable connection provided for that purpose.

The method and apparatus as described, state the patentees, afford a simple and economical arrangement whereby the steam required for the operation of the water gas set may be produced solely by the utilization of waste heat therefrom.

Prepayment Gas Meters.—No. 333,733.

KROMSCHRODER, F., of Osnabrück.

No. 24,508; Aug. 10, 1929.

This invention is concerned with meters in which a key can be inserted for effecting a closure of the stop valve at any time after the prepayment mechanism has been operated for opening the valve. Zeroizing of the meter is preferably accomplished without disturbing the reading of an index mechanism showing the total amount of gas metered. Consequently it has been necessary to provide a one-way connection, such as a ratchet and pawl, in order that the key operation may close the stop valve and zeroize the sub-customer's index without affecting the total index mechanism. A one-way clutch device to be operated by the key is arranged to connect a transmission spindle located between the meter driving or counting mechanism to a revoluble part associated with the valve closing mechanism and in alignment with the transmission spindle.

The one-way driving connection advantageously consists of clutch sleeves engaging one another with ratchet teeth on their ends, such sleeves having a non-slip clutching engagement when the meter drives the mechanism in the direction for closing the stop valve. However, when the key is applied for driving one of the sleeves in the direction for closing the said valve, the ratchet teeth on the ends of the sleeves slip past one another, the other sleeve having an axial sliding motion against the action of a spring to permit such slipping to take place.

Industrial Heating Systems.—No. 333,924.

PREMIX GAS PLANTS, LTD., and DOCKING, A., both of Westminster.

No. 12,633; April 23, 1929.

According to this invention, and in producer gas heating systems, provision is made, as and when required, for supplementing or replacing producer gas with town gas. To this end, and in a producer gas heating system, a so-called gas and air incorporator is also provided which is connected up to a town gas main, and valve controlled means are provided for admitting town gas from the incorporation to the producer gas system so that town gas of the same calorific value as the producer gas can be used wholly or in part in place of producer gas.

Normally, and when there is a full demand on the producer gas generator, producer gas will only be used for industrial heating purposes, and the valve between the gas and air mixer and the compressor will be closed. The capacity of the producer gas plant may be such as to supply sufficient gas for the normal requirements of the works or other installation to which the producer gas is supplied. At peak loads, however, or in the event of any unusual demand for gas the supply of producer gas is amplified by air-diluted town gas. In the event of a large number of furnaces or other gas heated appliances being shut down so that it would no longer be economical to burn producer gas, the producer gas plant can also be shut down.

Detachable Gas Burners.—No. 334,070.

GUHL, H., of Karlsruhe, i/Baden.

No. 26,500; Aug. 31, 1929. Convention date, March 19, 1929.

The object of this invention is to provide an atmospheric gas burner which, together with its nozzle, nozzle housing, and gas tap, can be removed conveniently without requiring that the whole bank of taps should be dismantled. This object is attained by mounting the removable burner body on a separate intermediate member screwed into the housing of the nozzle. The wall of the stove is clamped between this intermediate member and the housing of the nozzle so that both are secured to the wall of the stove reliably, and also in a readily detachable manner. The aperture in the nozzle housing in which the intermediate member engages is of larger diameter than the nozzle which is disposed behind it, so that the nozzle can be removed through the aperture. The nozzle housing is connected on the other side with the tap by means of this nozzle, which passes through the housing and engages in the tap. Thus, when the nozzle is unscrewed, the nozzle housing and the tap are disconnected.

Coke Ovens.—No. 334,050.

Woodall-Duckham (1920), Ltd., and Duckham, A. M., both of Victoria Street, S.W. 1.

No. 25,084; Aug. 16, 1929.

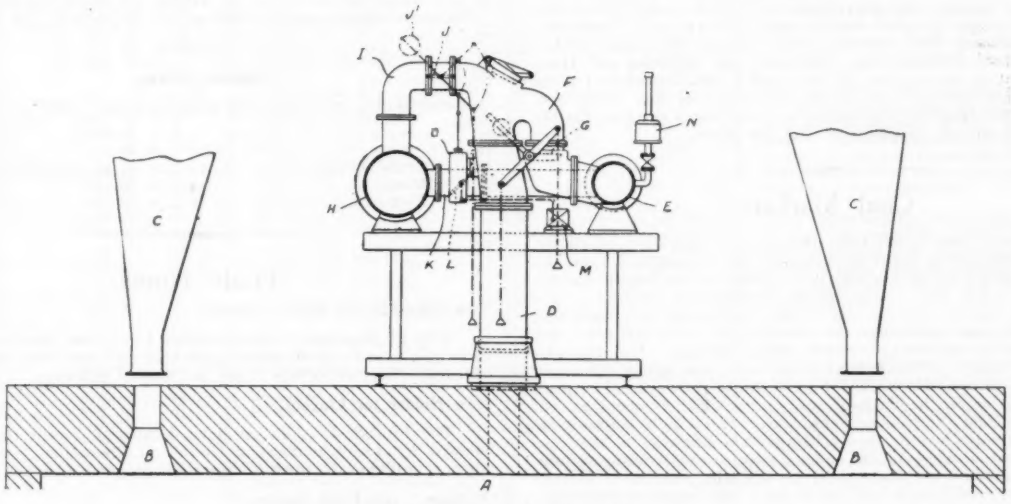
This invention relates to coke ovens, and has for its object to eliminate certain objectionable features, due to abnormal pressure conditions consequent upon the introduction of a fresh charge. The primary object is to prevent the rapid generation of a large volume of gas which takes place upon charging an oven from adversely affecting the pressure conditions which have to be maintained for the satisfactory working of the other ovens.

The invention is illustrated in the accompanying drawing as applied to a battery of coke ovens, the drawing showing in elevation the essential parts of the charging and gas collecting apparatus of one oven of the battery.

The oven A is provided near each end with a charging hole B into which the coal is delivered from a hopper C of the usual character, and the gas offtake D is placed substantially centrally between the two charging holes B. Consequently, when the fresh coal is charged simultaneously through the apertures B, the fresh charge will form two piles with inwardly converging slopes, between which will be a free space for the evolution of the gas situated immediately below the gas offtake D.

The offtake D communicates with the common gas collector main E through a pipe F provided with a valve G, and is also connected with the foul gas main H through a pipe I provided with a valve J, which may be of the butterfly type, as shown in the drawing, or may be of any suitable type of water-sealed valve. In normal working the valve G is open and the valve J is closed.

At suitable points it is customary to provide ducts K leading from the common collector E to the suction or foul gas main H, which



COKE OVEN GAS OFFTAKE.

is in direct communication with the exhauster. The regulators for maintaining the appropriate pressure in the collecting main are generally located in the ducts K, and usually consist, as shown, of a regulator valve L actuated by means of a motor M which is controlled by a pressure-actuated switch N. It is further customary to maintain a somewhat higher degree of suction in the foul gas main H than in the collecting main E.

If the large volume of gases generated immediately on charging should be conducted through the individual offtakes D to the common collecting main E, it follows that the pressure conditions in this main will become upset, and in order to re-establish the pressure conditions it becomes necessary, by the operation of the governing device, to subject the collecting main as a whole to increased suction, so that the correct pressure conditions for the ovens which are not being charged would become adversely affected.

If, however, the valve J, which is normally closed, is opened immediately upon the charge being introduced into the oven, and at the same time the valve G leading to the collecting main E is closed, the gases evolved will pass directly through the pipe I into the foul main. The valves G and J are preferably interconnected, so that when one is fully open the other is completely closed, and conversely.

As the rate of generation of gases during charging quickly reaches a maximum and then diminishes following the gradually descending curve, it follows that it is not necessary, or even desirable, to keep the valve J open to its fullest extent throughout the whole time of the charging operation. Therefore, it is preferable that the valve should automatically and gradually close when the rate of generation of gases during charging has passed its maximum and is beginning to diminish, becoming completely closed again when normal pressure conditions have been re-established. This may be done in many ways, as, for example, by loading the valve by a weight indicated at J^1, which operates to close the valve, and providing a resistance tending to counteract the closure, such as a hydraulic dashpot indicated at O.

In order to prevent blocking up of the by-pass I between the suction main H and the gas offtake D, liquor flushing means may be provided in the by-pass pipe.

Gasifying Coal.—No. 334,133.

Humphreys & Glasgow, Ltd., of Westminster (Assignees of J. M. Rusby, of Philadelphia).

No. 35,330; Nov. 19, 1929. Convention date, Jan. 21, 1929.

The object of this invention is to provide improved means for effecting a better distribution, in the upper portion of the fuel column of a gas generator, of the gases which are passed through the column. It is particularly adapted to water gas generators using bituminous coal as fuel.

A common difficulty in such use of bituminous coal, especially in the larger generators, is its descent in the central portion of the fuel column, to the water gas zone, uncarbonized. This lack of carbonization, state the patentees, appears to be chiefly due to the difficulty of passing the hot carbonizing gases through the interior portions of the upper part of the fuel column. This invention provides diaphragms extending downward through the upper part of the fuel column, affording a large area of "wall" surface in the interior of the column along which the heating gases may pass. These diaphragms do not extend from wall to wall, and do not divide the fuel bed into entirely separate sections. This non-extension from wall to wall permits the passage of gas laterally from one section of the upper part of the fuel bed to another, and tends to equalize the pressure laterally throughout the column. This equalization of pressure tends to produce an equal flow of gas through the various portions of the fuel bed, and avoids a concentration of the flow in one section. When partitions running from wall to wall and completely compartmenting the fuel are employed, state the patentees, there is a continual danger of such concentration of flow in one section with attendant failure of carbonization in the others. The non-extension of the diaphragms from wall to wall also permits the movement of the diaphragms. This motion need not be great; a slight rocking of the diaphragm, for example, may be sufficient to open up a fissure sufficient for an increased passage of gas over the passage along the diaphragm wall when stationary. Instead of rocking, the diaphragm may be slightly raised and lowered, or it may be raised somewhat and be permitted to sink downward slowly with the fuel. In the latter case, the diaphragm may be tapered in thickness, so that a very slight lifting will open a fissure for the passage of a considerable amount of gas.

The diaphragms are preferably of heat-resisting metal, for reasons of strength and the fact that they need not be thick and take up much space. On the other hand, refractory diaphragms may be employed if desired and have the advantage of being able to store more heat from the gases, and to radiate this heat during periods when, as is possible in some processes, no carbonizing gas or a decreased amount of it is passed through the coal.

Applications for Patents.

[Extracted from the "Official Journal" for Sept. 17.]

Nos. 26,711—27,433.

Allen-Liversidge, Ltd.—"Device for prevention of back fires in gas apparatus." No. 27,346.

Ellingham, H. A.—"Portable gas griller or heater." No. 27,056.

Fox, R.—"Gas meters." No. 27,431.

Pintsch Akt.-Ges., J.—"Water gas generators." No. 27,183.

Pyle, C. R.—"Combination gas stoves." No. 26,796.

Robinson & Co. (Liverpool), Ltd., J. H.—"Stuffing boxes." No. 27,430.

Robinson & Co. (Liverpool), Ltd., J. H.—See Fox, R. No. 27,431.

Stephenson, A.—See Allen-Liversidge, Ltd. No. 27,346.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Following on the unsettled outlook of the previous week, stock markets began the new Account last week in a depressed mood, and changes in prices generally were against holders. As the week progressed, however, prospects became considerably brighter, and British Funds, headed by 5 p.ct. War Loan which achieved another high record at 104 7/16, gained strength under renewed support. Unfortunately the week closed with a return to dull conditions.

The general tone of uncertainty is not, however, reflected in the Gas Market. Business in Gas stocks and shares continues to be well maintained, and the demand is such that no difficulty is experienced in placing any parcels of stock coming into the market. Liverpool 5 p.ct. ordinary, which has stood at a low price for some time past, headed the list of increases last week with a rise of 3 points at the local Exchange to 93½-94½. On the basis of the distribution for the past two years—viz., 6 p.ct. per annum—the yield at this price is £6 7s. 8d. p.ct., which, having regard to the very high-class security offered, should be of interest to those requiring a permanent investment. Another stock which is rather undervalued at the present time is the consolidated stock of the Hornsey Company. This Company also distributed 6 p.ct. last year; and at the current price of 89½, the yield in this case is £6 14s. p.ct. The stock, however, is closely held and not always readily obtainable. Other stocks to record increases last week were the Brighton and Hove 5 p.ct. 1 point to 100-103, and Wandsworth 5 p.ct. debenture 1 point to 97-100. The only fall in value, apart from *ex* div. reductions, was that of the Imperial Continental capital, which dropped sharply to 335-355—a fall of 20 points during the week.

Coal Markets.

There is no improvement from the general depression in all the districts. Business on home account, as can be imagined from the state of industry generally, is very quiet indeed, while export markets continue to suffer from acute foreign competition, excessive Continental coal stocks, and the uncertainty concerning the marketing schemes, with their minimum prices and quotas. It is difficult to see how they are going to improve the export position. For example, Poland, in competition with Northumberland, has recently obtained an order for 48,000 tons for the Finnish State railways. The price is reported to be on the basis of 10s. f.o.b., which is about 2s. 9d. below the current Northumberland price. It is quite unthinkable that even a Coal Mines Act can bridge such a difference as this.

The gas coal markets, for the time of year, are most disappointing. Durham quotations are maintained by adjusting output to requirements. Wear specials ask 15s. to 15s. 3d.; best qualities (Holmside, Boldon class) are 14s. 6d. to 14s. 9d. and seconds 12s. 6d. to 13s. 3d. Yorkshire screened gas for export is 15s. to 16s. Durham coking sorts are very slack at 12s. 6d. to 13s., in spite of a reasonably steady demand for foundry coke. Gas coke is still about the best market of all, and prices remain steady round 21s. 6d.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 29.

The values of tar products remain unaltered, and are as follows:

Pitch, 47s. 6d. per ton f.o.b.

Creosote, for export, 6d. to 6¼d. per gallon f.o.b.

Pure toluole, 2s. 2d. to 2s. 3d. per gallon; pure benzole, 1s. 10d. to 1s. 11d. per gallon; solvent naphtha, 95/160, 1s. 5d. to 1s. 6d. per gallon; pyridine bases, about 3d. 9d. per gallon.

All these prices are *ex* sellers' works.

Tar Products in the Provinces.

Sept. 29.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 24s. Pitch—East Coast, 46s. f.o.b. West Coast, Manchester, Liverpool, Clyde, 46s. f.o.b.* Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 2¼d. to 1s. 2¾d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3½d. to 3¾d.; low gravity, 1½d.; Scotland, 3¼d. to 3¾d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 1s. 4½d. to 1s. 6d. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Sept.* 27.

The market continues quiet, with prices weak. Motor benzole is easier in tone following the reduction in petrol prices.

Pitch.—Orders are still scarce, and nominal value is unchanged at 45s. to 47s. 6d. per ton f.o.b. Glasgow. Home trade is dull at 45s. per ton *ex works*.

Refined tar to Ministry of Transport Specification is in poor request at 3d. to 3¼d. per gallon f.o.r. works in buyers' packages.

Creosote.—Only the better grades are in demand. B.E.S.A. Specification is 2¾d. to 3¼d. per gallon; low gravity, 3d. to 3½d. per gallon; and neutral oil, 3d. to 3¼d. per gallon—all free on rails in bulk.

Cresylic.—Very few orders are passing, and quotations are easy. Pale, 97/99 p.ct. is 1s. 7d. to 1s. 8d. per gallon; dark, 97/99 p.ct., 1s. 6d. to 1s. 7d. per gallon; and pale, 99/100 p.ct., 1s. 9d. to 1s. 10d. per gallon—all *ex* works naked.

Crude naphtha.—The value continues steady at 4¼d. to 4¾d. per gallon f.o.r. works in bulk.

Solvent naphtha.—Both grades are accumulating at makers' works. 90/160 is 1s. 2½d. to 1s. 3½d. per gallon, and 90/190, 1s. to 1s. 1d. per gallon.

Motor benzole.—Value is lower at 1s. 5¼d. to 1s. 5¾d. per gallon in bulk quantities *ex* works, but buying has stopped momentarily.

Pyridines remain nominal with 90/160 at 3s. to 3s. 3d. per gallon.

Benzole Prices.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole	0 8	to 0 9	per gallon at works
Motor ,,	1 3½	,, 1 4½	,, ,, ,,
Pure ,,	1 8	,, 1 9	,, ,, ,,

Trade Notes.

New Gasholder for Boston (Lincs.).

Messrs. Broadhead Constructions, Ltd., have received an order for a 750,000 c.ft. spiral-guided gasholder and steel tank with foundation from the Boston Gas Light and Coke Company.

New Holder for Lincoln.

The Lincoln Corporation have decided to accept the tender of Messrs. Newton, Chambers, & Co., Ltd., Thorncliffe, near Sheffield, for a 1½ million c.ft. three-lift spiral-guided gasholder and steel tank.

"Vesta" Gas-Fired Boilers.

A booklet has recently been published by Autocontrol Boilers, Ltd., of Victoria Station House, S.W. 1, describing their "Vesta" gas-fired boiler. Some of the economical features of the boiler are described and some recent installations illustrated. It is stated that the overall efficiency of this boiler, under practical working conditions, is 90 p.ct. This remarkably high efficiency is achieved by a process of preheating a constant supply of air and gas which is atomized before mixing and afterwards burned in refractory material under sealed conditions. A limited supply of air is admitted, sufficient to support combustion under induced draught. The gases, during combustion, reach a temperature of 2800° Fahr., and are completely burned before coming into contact with any of the water-cooled surfaces. Thereafter, they are gradually reduced until exhausted at a temperature of 115° Fahr., or approximately 5° Fahr. above the return water temperature of the warming system, practically eliminating heat loss in flue temperature.

Concerning "Solvac."

The use of dangerous caustic and similar preparations has been for many years the only effective means of cleaning, and the advent of a non-caustic and perfectly harmless method is due to the efforts of the Dirtsolva Manufacturing Company, Ltd., of Brighton, who have produced a compound known as "Solvac." This is absolutely safe to handle; does not contain any caustic, grit, acid, or any harmful ingredient. It does its work efficiently and quickly and obviates any necessity to dismantle the cooker, or even to make it hot, as "Solvac" can be applied cold and wiped off with a rag within a few moments. The advantage of being able to clean the cooker *in situ* by the "Solvac" method naturally means a big saving of time. And the housewife will appreciate this easy means of keeping her cooker clean. With the harmless "Solvac" method, she has a great incentive to keep the cooker clean; further, this operation need not give rise to any fear of dirty hands, for "Solvac" is in itself a hand-cleanser, and contains a valuable skin emollient. "Solvac" is available in patented tins designed specially to prevent any possibility of cutting the hands on the inside edges. We understand that the makers are prepared to send samples to any gas engineer interested.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Sept. 26	Rise or Fall on Week.	Transact'ns Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c. max. C. .	73—78	..	..
522,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	68—71	..	..
1,551,868	,,	Apl. 3	7⅝	7⅝	Alliance & Dublin Ord. . .	96—99	..	99
374,000	,,	July 10	4	4	Do. 4 p.c. Deb. . .	60—63	..	..
522,655	,,	Aug. 28	7	7	Barnet Ord. 7 p.c.	106—109	..	..
300.000	1	Apl. 24	1/4½	1/7½	Bombay, Ltd.	16/-—18/-	..	/.—16/9
174,500	10	Aug. 14	9	9	Bournemouth 5 p.c. . . .	14—15	..	..
500.050	10	,,	7	7	Do. B 7 p.c. . .	12½—12⅝	..	£12/6/0
439,160	10	,,	6	6	Do. Pref. 6 p.c. .	10¾—11½	..	..
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb. .	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb. .	74—77	..	..
357,900	,,	Aug. 28	7½	7½	Brighton & Hove 6 p.c. Con.	112—117	..	..
871,880	,,	,,	6½	6½	Do. 5 p.c. Con.	103—103	+1	..
1,287,500	,,	July 24	5	5	Bristol 5 p.c. max.	89½—90½a*	+1½	..
855,000	,,	Sept. 25	8	7	British Ord.	108—113*	−2	113½—114½
100,000	,,	June 26	7	7	Do. 7 p.c. Pref.	112—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. . .	70—73	..	71½
450 000	,,	,,	5	5	Do. 5 p.c. Red. Deb. . .	94—97	..	..
100,000	,,	June 26	5	5	Cambridge 5 p.c. Deb. . .	94—97	..	..
100,000	10	May 22	6	10	Cape Town, Ltd.	9—10	..	..
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref. . .	6½—7½	..	7
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. . .	71—76	..	..
626,860	,,	July 24	6	6	Cardiff Con. Ord.	94—97	..	..
287,860	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb. .	97—100	..	..
157,150	,,	Aug. 14	6½	5	Chester 5 p.c. Ord.	86—91b	..	..
98,936	1	May 8	†2/-	†2/-	Colombo, Ltd. Ord. . . .	33/—35/-	..	..
24,500	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref. . .	18/6—20/6	..	..
609,204	1	Apl. 3	1/9⅜	1/9⅜	Colonial Gas Assn. Ld. Ord	17/—19/-	..	17/—17/3
296,053	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	19/—21/-	..	..
2,073,280	Stk.	July 24	7	6	Commercial Ord.	94—97	..	94½—95
475,000	,,	June 26	3	3	Do. 3 p.c. Deb. . .	56—59	..	..
787,560	,,	Aug. 14	7	7	Croydon sliding scale . .	104—107	..	106½
453,100	,,	,,	5	5	Do. max. div. . . .	81—84	..	..
542,270	,,	Aug. 14	10	7	Derby Con.	115—125e	..	..
55,000	,,	June 26	4	4	Do. Deb.	65—70e	..	..
209,000	,,	Aug. 28	5	5	East Hull Ord. 5 p.c. . .	69—71	..	..
1,002,180	,,	Sept. 25	†7g	†4	European, Ltd.	108—118*	−2	113—115
18,629,125	,,	July 24	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	18/9—19/3f	..	18/9—19/-
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. . . .	63—65	..	64½
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref. . .	78—81	..	79½—80½
5,602,620	,,	June 26	3	3	Do. 3 p.c. Con. Deb. . .	59—62	..	61½—62
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. . .	98—101	..	..
161,480	,,	Sept. 11	10	10	Harrogate Cons. 10 p.c. max.	155—160	..	..
82,500	,,	Aug. 28	7	7	Hastings & St. L. 5 p.c. Conv.	97—102	..	..
258,740	,,	,,	5½	5½	Do. 3½p.c. Conv.	76—81	..	..
70,000	10	May 22	†10	‡	Hongkong & China, Ltd. .	13½—14½	..	..
213,200	Stk.	Aug. 14	6	6	Hornsey Con. 3½ p.c. . . .	88—91	..	..
2,436,594	,,	May 22	10	25	Imperial Continental Cap. .	335—355	−20	339—362
223,180	,,	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	50—85	..	..
235,242	,,	Aug. 14	8½	8½	Lea Bridge 5 p.c. Ord. . .	123—128	..	125—126
2,145,907	,,	Aug. 14	6	6	Liverpool 5 p.c. Ord. . . .	93¼—94¼b	+3	..
600,000	,,	Sept. 25	7	7	Do. 7 p.c. Red. Pref. .	97½—99½b*	−2½	..
165,736	,,	Aug. 28	8	9	Maidstone 5 p.c. Cap. . .	120—125	..	..
68,480	,,	June 26	3	3	Do. 3 p.c. Deb. . .	51—54	..	..
75,000	5	June 26	†10	†10	Malta & Mediterranean . .	5¼—6	..	..
322,000	—	Apl. 1	5½	5½	Metrop'itan (of Melbourne) 5½ p.c. Red. Deb. . . .	90—93	..	..
675,000	Stk.	May 22	†6	†8	Montevideo, Ltd.	105—110	..	106—108
2,061,315	,,	July 24	5½	5	Newcastle & Gateshead Con.	15/9—16/3d/	..	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref. .	70½—71½d	..	..
691,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb. .	66½—67½d	..	..
169,940	,,	Aug. 28	7½	7½	North Middlesex 6 p.c. Con.	106—111	..	..
396,160	,,	Aug. 14	5	5	Northampton 5 p.c. max. .	76—81	..	..
300,000	,,	Apl. 24	9	7	Oriental, Ltd.	108—113	..	111½
60,000	5	13 My., '15	—	—	Ottoman	0—¼	..	..
205,162	Stk.	June 26	8	8	Plym'th & Stonehouse 5 p.c.	110—115	..	..
424,416	,,	Aug. 28	8	8	Portsm'th Con. Stk. 4 p.c. Std	107—112	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max. . .	77—80	..	..
186,000	100	June 2	4	4	Primitiva 4 p.c. Red. Deb. .	96—99	..	..
677,837	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	81—84	..	..
371,496	,,	June 26	4	4	Do. 4 p.c. Cons. Deb. .	81—84	..	..
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref. . .	8½—8⅝*	−¼	..
1,736,968	Stk.	Aug. 28	6½	6½	Sheffield Cons.	100—103e	..	..
95,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—78e	..	..
90,000	10	June 5	‡4	‡5	South African	4—6	..	..
6,709,895	Stk.	Aug. 14	7½	5	South Met. Ord.	102—104	..	102½—103½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	107—110	..	107—107½
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb. . .	59—62	..	61
734,000	,,	Sept. 11	6½	6½	Do. 6½ p.c. Red. Db.	98—100*	..	..
91,500	,,	Aug. 14	8½	8½	South Shields Con. . . .	103—104d	..	..
1,543,795	,,	July 24	6½	6½	South Suburban Ord. 5 p.c.	100—103	..	101½—102½
468,837	,,	June 26	5	5	Do. 5 p.c. Deb.	93—96	..	..
647,740	,,	Aug. 28	5	5	Southampton Ord. 5 p.c. max.	75—78	..	..
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	73—76	..	..
179,014	,,	July 24	8	8	Sutton Ord.	110—113	..	..
94,500	,,	June 26	5	5	Do. 5 p.c. Deb. . . .	93—96	..	..
250,000	,,	Aug. 28	7	7	Swansea 7 p.c. Red. Pref. .	98—101	..	..
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb. .	98—101	..	..
1,076,490	,,	July 24	6⅝	6⅝	Tottenham District Ord. . .	102—106	..	103½—104½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. . .	95—98	..	..
199,005	,,	June 26	4	4	Do. 4 p.c. Deb. . .	75—78	..	..
182,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	3¾—4¾	..	..
85,701	Stk.	Sept. 25	6	6	Do. 6 p.c. Red. Deb.	73—78*	−2	..
309,094	,,	Aug. 28	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	95—100	..	96—97
88,330	,,	,,	5	5	Do. 5 p.c. pref. . .	85—90	..	..
1,180,970	,,	July 10	—	7	Wandsworth, Wimbledon, and Epsom Cons. . .	107—112	..	110½—111
200,000	,,	,,	5	5	Do. 5 p.c. Pref.	89—92	..	..
488,344	,,	June 26	5	5	Do. 5 p.c. Deb.	97—100	+1	98½—99½

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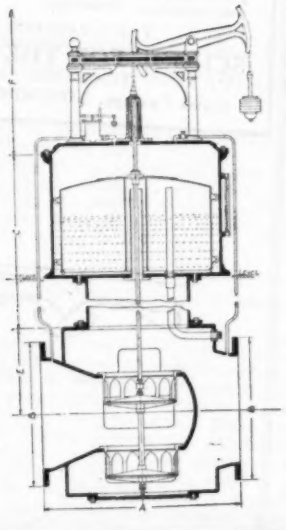

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CONTENTS

EDITORIAL NOTES.

A GLANCE AT THE CONTENTS . . . 81
B.C.G.A. Annual Conference 82
Against the Halfpenny Unit 82
An "A.G.A." Publication 82
Gas Rates for Water Heating 83
Unemployment Grants 83
Remember the Street Lighting—As Others See Us—Are We Ready?—Cost of Advertisements and Rating 84

Forthcoming Engagements 84

CORRESPONDENCE.

The Gas Unit 85
Distance Gas Switches 85

Obituary—
Mr. James Dougall 86
Personal 86

THE NEWS OF THE WEEK.

Coventry Gas Committee—Sir John Cass Coal Carbonization Lectures—Institute of Fuel—Cost of the Gasholder Accident at Keighley 86

THE NEWS OF THE WEEK—(*continued*).

Dewsbury Gas Department—Metcalfs (Tar Distillers)—Costing: An Aid to Management—Bradford Gas Department—Shipley Gas Committee—Coal as Ships' Fuel . . 87
New Gas Rates at Halifax—"Gas Unit" of 4000 B.Th.U. 87
In Honour of Sir Francis Goodenough, C.B.E. 87
First Prize for the Leamington Priors Gas Company 88
Alliance and Dublin Company's Successful Year 88
A New Gas Heater 88
Works Canteen Opened at Wakefield . . . 88
The Harrow Gasholder 89
The Ministry of Health Report 89

Notes on New Books 89
Uniform Calorific Value? 90
In Continental Countries—Abstract Translations from the Technical Press of France and Germany 91
Attractive Gas Showrooms at Leatherhead . 92
Glover-West Verticals in Brittany 93

THE "JOURNAL" TECHNICAL RECORD.

North of England Gas Managers' Association—
General Business 95
Presidential Address of Mr. A. E. Ruffhead, A.M.Inst.C.E. 96

REGISTER OF PATENTS.

Protecting Gas Mains from Backfire—Mangiameli, F. 100
Road Surfacing Material—South Metropolitan Gas Company and Pickard, H. . . 100
Carburetted Water Gas Manufacture—Humphreys & Glasgow, Ltd. 100

LEGAL INTELLIGENCE.

Arrest of Nottingham Gas Official 100

Gas Acts (1920 and 1929) Orders 100
Rating a Gas Company—Questions of Profit 101

GAS MARKETS AND MANUFACTURES.

Stock Market Report 102
Coal Markets 102
Current Sales of Gas Products 102
Trade Notes 102
Contracts Advertised To-Day 102

Stock and Share List 103

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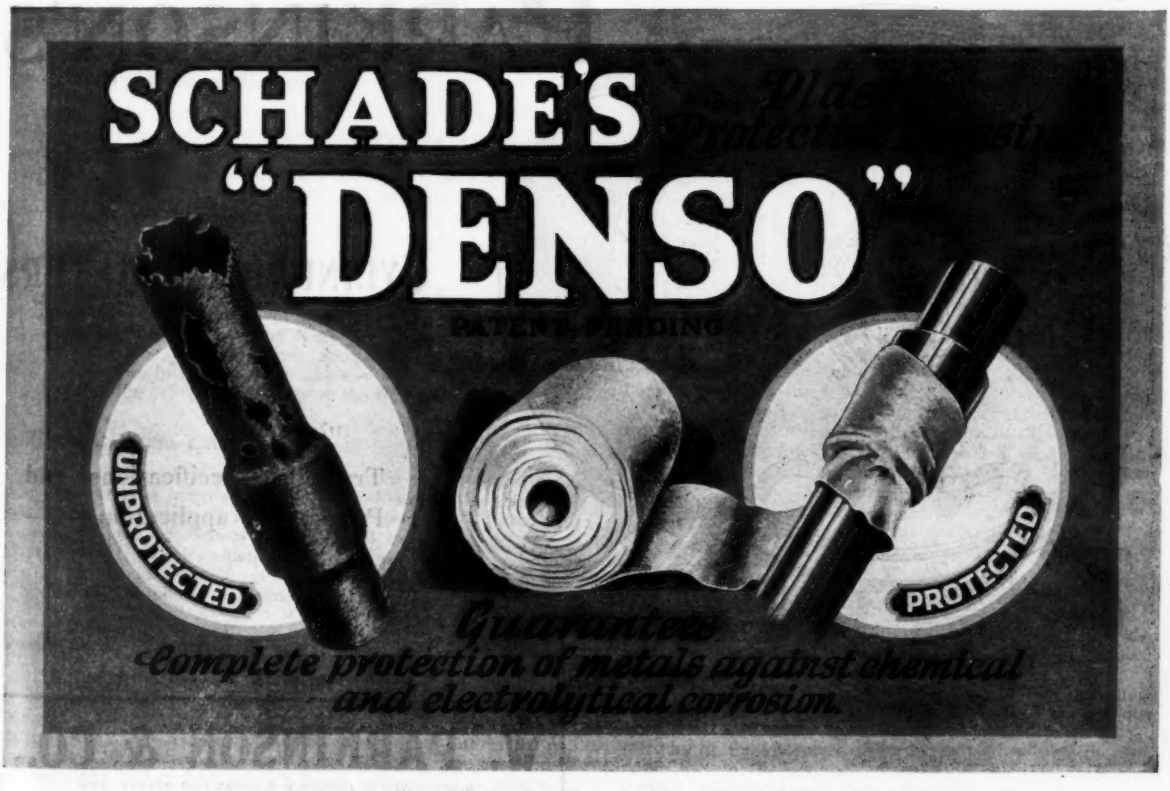

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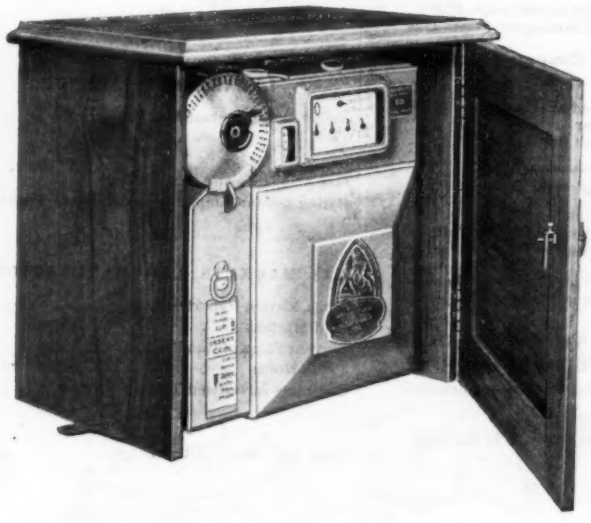

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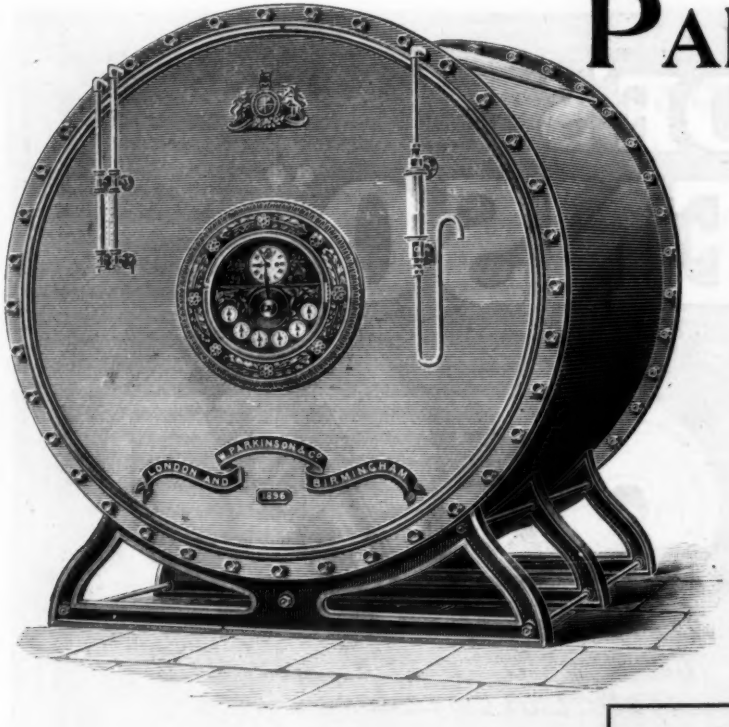

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